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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

Vol. 37.] 1940. [No. 1.

SUMMARY OF RECENT ABSTRACTS.

I. CHOLERA.*

Epidemiology.

In the epidemiology of cholera butter (p. 365) and prawns (p. 366) have been incriminated. Carriers were found in a gaol kitchen by MAITRA *et al.* (p. 366) and in Calcutta PASRICHA *et al.* (p. 367) isolated *V. cholerae* from the stools of three of 2,000 persons, not suffering from cholera, who were investigated. The contamination of water by pilgrims, far from the place of origin of the disease, has been demonstrated (p. 365).

A large scale contamination of river water occurs in the valley of the river Yuan through the agency of the crews of junks who deposit urine and faeces in the river, and during the process of transporting night soil in barges for the use of farmers (p. 894). Living *V. cholerae* have been recovered from the river water but it is not held to be probable that infection travels far by this means, and the disease was often found to spread upstream. In this area ROBERTSON and POLLITZER consider that flies play a part in transmission, but that the principal source of infection is contaminated water.

GENEVRAY (p. 904) records a mortality of 60–80 per cent. in an epidemic in Indo-China.

Aetiology.

Cultivation.—READ (p. 894) obtained the best results in the differential isolation of *V. cholerae* by the use of a modification of Wilson and Blair's bismuth sulphite enrichment medium. GENEVRAY and BRUNEAU (p. 378) use peptone water containing 3 per cent. salt for isolation, and GENEVRAY (p. 904) supports previous findings that *V. cholerae* is resistant to high concentrations of salt and can grow in 8 per cent. sodium chloride. READ *et al.* (p. 895) show that both salt and organic matter are necessary for the multiplication and

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1939, Vol. 36. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

survival of *V. cholerae* in artificial water. Equal concentration of other organisms does not appear to prevent multiplication and survival up to 5 or more days.

BANERJEE (p. 378) uses Ramon's glucose medium for the cultivation of *V. cholerae* under anaerobic conditions. The *p*H does not change in this medium. To facilitate the study of the end products of glucose metabolism by *V. cholerae* and *V. El Tor*, BAARS (p. 372) added chalk to the culture medium, thus neutralizing the acid formed and preventing auto-sterilization. The ratio of produced carbon dioxide and fermented sugar was found to be 0·88 for the Voges-Proskauer positive *V. El Tor* and 0·52 for the V.-P. negative *V. cholerae.*

BOSE (p. 895) notes that the maximum growth of *V. cholerae* on papain-mutton agar takes place when the digestion of the mutton has been allowed to proceed for 2 hours. VARDON and DATTA ROY (p. 377) have elaborated a cheap papain-casein medium satisfactory for the preparation of therapeutic bacteriophage.

Identification.—Discussing the criteria for the absolute diagnosis of the true cholera vibrio TAYLOR (p. 368) re-states the view adopted by bacteriologists in India that it belongs to Group " O " No. 1 of Gardner and Venkatraman, is non-haemolytic and gives characteristic biochemical reactions. The fact that vibrios possessing " H " antigenic fractions in common with *V. cholerae*, or belonging to " O " groups other than " O " No. 1, are found in both healthy persons and cholera patients is not surprising when it is realized that such vibrios are found in water in which the chance of contamination with cholera is absolutely excluded. A similar argument is advanced by TAYLOR and AHUJA (p. 376) who consider that the H flagellar antigen may be common to many vibrios and that therefore agglutinability with Inaba HO serum is not an adequate test for true *V. cholerae.* Vibrios are constantly found in wells, tanks and rivers of Northern India where cholera is not endemic, but none of these agglutinate with pure O cholera serum. At the Medical Research Institute, Shillong (p. 897) it was found impossible to transform agglutinable into inagglutinable vibrios. Vibrios are almost universally present in natural water sources but none of those found were agglutinable.

MERTENS and MOCHTAR (p. 901) found a lack of serological unity in 32 strains of vibrios, agglutinable with HO cholera serum, isolated from stools of persons not suffering from cholera. They confirm that anti-O cholera sera are more specifically diagnostic than HO, and that classification by fermentation reactions alone is insufficient. RUSSO (p. 369) agrees that monovalent antiserum O Inaba is specific, and states that it is preferable to antisera O Ogawa and Napoli for the identification of *V. cholerae.* At the beginning of an epidemic the first cases are not always typical and he therefore advises that the specific biological characters of the vibrios should be determined before the official announcement of cholera is made. [This does not appear to mean that no control measures should be taken before specific diagnosis is made.]

LINTON *et al.* (p. 370) discovered that in strains of *V. cholerae* isolated early in an epidemic there was a lipoid-polysaccharide complex which was absent from strains isolated later and from those maintained for long periods in laboratories and in water and carrier strains. In studying antigenic structure therefore it is advisable to use freshly isolated strains.

RUSSO (p. 369) claims that 0·5 per cent. lithium chloride, 0·1 per cent. phenol or alcohol in agar media inhibit the development of cilia and therefore produce vibrios with purely O antigens. Of these the lithium chloride is the most effective, and its use should help to bring about concordant results in different laboratories.

At the King Institute, Guindy (p. 366) it was shown that vibrios ingested by flies are either rapidly excreted or destroyed in the gut, and that there is apparently a vibriocidal action by extracts of crop and intestine. LAL *et al.* (p. 896) found changes in morphology, metabolic activity and chemical type in many strains of *V. cholerae* passed through clean flies, but no change in serological type or fermentation reactions. Vibrios isolated from flies and cockroaches in nature were all found to be inagglutinable by Inaba O serum by PASRICHA *et al.* (p. 377), and LAHIRI and DAS (p. 377) report the same finding in vibrios isolated from 195 animals.

Studying the inhibition of choleraphages by vibrio extracts and the precipitin reaction of these extracts, MAITRA (p. 900) shows that two groups of vibrios may be distinguished, (1) smooth *V. cholerae* and *V. El Tor* of O subgroup 1. and (2) water and other vibrios.

In Shanghai in 1937 NISHIMURA (p. 367) found all of 16 strains isolated to be of the Inaba type, but in 1938 FOURNIER (p. 895) found 93 of 100 strains to be of intermediate Hikojima type. The latter epidemic therefore resembles that of 1933. At the King Institute, Guindy (p. 366) it was shown that several hundred Ogawa strains were found in the field, thus contradicting the opinion that this strain is a purely laboratory phase of culture.

General.—LAIGRET and AUBURTIN (p. 370) succeeded in reviving cholera vibrios which had been desiccated over calcium chloride for not more than 24 hours and thereafter preserved in a sterile rubber-stoppered tube at room temperature for 5 weeks. They point out that resistance to desiccation may have a bearing on the epidemiology of the disease.

RAYNAL *et al.* (p. 896) have extracted *V. cholerae* with trichloracetic acid and obtained a liquid which precipitates with anticholera serum, is toxic for mouse and rabbit, has antigenic and immunizing properties and provokes allergic response in sensitized animals. CHECCACCI (p. 897) elaborates the properties of a similar extract which is identifiable with the specific O antigen of Gardner and Venkatraman. Serum prepared against this extract can be used for the identification of *V. cholerae* but is peculiar in that it is specific either for living vibrios or for those killed at 100°C. for 2 hours.

LINTON *et al.* (p. 371) show that a shift in surface potential, as after subjecting the organisms to electrophoresis, is the cause of serological distinction between R and S derivatives. SEAL and MITRA (p. 897) investigated the oxidation-reduction potentials of *V. cholerae.*

Studies on haemolysin, etc.—BERNARD *et al.* (p. 372) have perfected a technique for the extraction of haemolysin from agar or bouillon culture media used for the growth of *V. El Tor.* Only a feeble haemolysin can be obtained from *V. cholerae* and the authors regard that from *V. El Tor* as an exohaemolysin and that from *V. cholerae* as an endohaemolysin. The same authors (p. 373) present the hypothesis that the two haemolysins are the same but that in *V. cholerae* it is combined with a neutralizing substance. This might explain anomalous features in the *V. cholerae* haemolysin. They (p. 374) describe colour reactions in suspensions of red cells to which haemolysin or living

vibrios are added. OTTEN (p. 899) also found that some irregular and weak haemolysis may be displayed by *V. cholerae*, but DEL FAVERO (p. 374) shows that laboratory strains of *V. cholerae* kept for 15 passages at 20°C. became strongly haemolytic.

GOYLE (p. 898) shows that for the study of vibrio haemolysin, cultures of 24 hours incubation should be used, as the potency may diminish with longer growth. Erythrocytes of different animals show varying sensitivity to haemolysin. Haemolysin is filterable, is destroyed by moderate heat, but may be preserved in the cold. Anti-haemolysin serum neutralizes but typical anti-cholera serum does not. BEEUWKES (p. 899) contends that the ferments responsible for haemodigestion and liquefaction of gelatin are distinct. El Tor strains cultivated on blood agar contain more than those grown on egg.

Studying 176 strains of vibrios, MERTENS *et al.* (p. 371), found that though they showed certain common characteristics, 105 were non-haemolytic and were therefore true *V. cholerae*, all of them except two being Voges-Proskauer negative; 71 were haemolytic and were therefore El Tor type and of these 62 were Voges-Proskauer positive.

OMAR (p. 375) has isolated *V. El Tor* from a woman who has never left Egypt.

In an epidemic in the Celebes DE MOOR (p. 374) isolated 400 examples of a strongly haemolytic strain identical with *V. El Tor*. The disease varied in severity from a mild to a fulminating type and one epidemic was accompanied by an outbreak of Shiga dysentery. VAN LOGHEM (p. 375) confirmed that two of the strains, which he examined, were *V. El Tor*. He proposes to distinguish between this disease and true cholera by naming the former El Tor enteritis. OTTEN (p. 899) points out that the El Tor vibrio is usually found in patients with symptoms of dysentery, or in sporadic cases or in healthy individuals. Studying the strains isolated in the epidemic in the Celebes he found that haemolysis was weaker than with typical El Tor. He points out that the haemolysis test should be standardized. He emphasizes, in dealing with the Celebes strain, that haemolysin is present in 24 hours old but absent in 5 days old cultures.

Pathology and Clinical.

BANERJEE (p. 901) considers that destruction of the intestinal epithelium may be the cause of the draining of body fluids and salts. In the "vasomotor failure" type of disease an allergic process may play a part in the profuse evacuation. A "renal failure" type is recognized in which hypochloraemia may be of more importance than simple dehydration. He suggests that absorption of histamine may be responsible for the profound fall of blood pressure. CHATTERJEE (p. 902) agrees with Banerjee in noting that dryness of the serosa is not seen except in dehydrated patients. Surface epithelium may be perfectly intact and this author is impresesd by the fact that for so violent a degree of gastro-intestinal disturbance there is surprisingly little inflammatory change. He found an eosinophilia of 15–20 per cent. in the bone marrow, a reaction very unlike that of inflammatory toxaemia.

DEMONTE and GUPTA (p. 379) failed to isolate the cholera vibrio from the blood of 26 cholera patients, but PASRICHA *et al.* (p. 379) isolated it from the liver of one patient. None was isolated from the urine of 122 patients by CHATTERJEE and MALIK (p. 379).

Using white mice, KOESOEMADILAGA (p. 898) showed that blood infection occurs shortly after feeding with or intraperitoneal injection of suspensions of cholera vibrios and that intestinal infections occurred later.

PASRICHA *et al.* (p. 902) investigated the serum reactions of 175 patients. H agglutinins appear earlier than O and may be present on the 4th day. They act only on *V. cholerae*, and on homologous better than on Inaba strains. The serological test may therefore be of material assistance in diagnosis. POLEFF (p. 903) describes an agglutination test in which agglutinating serum is used with the actual suspected stool.

GHOSH (p. 379) reports 7 patients in whom *Ps. pyocyanea* apparently produced symptoms typical of cholera.

In treatment MASSIAS (p. 380) injects intravenously 20 cc. of a 20 per cent. solution of sodium chloride to overcome hypochloraemia and this dose may be repeated in 12 hours. Mortality was thus lowered to 22 per cent., but he suggests that 10 per cent. may be a better concentration to use.

THOMAS and TING (p. 380) consider that the dangerous symptoms observed after the use of intravenous salines are due to pyrogenic substances in the distilled water used, and give instructions as to the careful preparation of the materials. Rigor frequently follows the use of intravenous saline, and to prevent this BANERJEE (p. 381) uses the solution at a temperature as much below 36·7°C. (98°F.) as the rectal temperature is above it, and vice versa. Thus with a rectal temperature of 38°C. the solution should be at 35·4°C. High rectal temperature may first be reduced by an enema of 15 to 20 ounces of ice-cooled saline.

PASRICHA *et al.* (p. 903) compared 5 methods of treatment in comparable groups of patients. Bacteriophage apparently gave better results than calomel, potassium permanganate, essential oils or M & B 693, and the authors advise its adoption as a routine. CHATTERJEE and DEO (p. 381) combine A phage with others in treatment, and give information as to the methods of bottling phage suspension.

Control and Vaccination.

TAYLOR (p. 368) emphasizes the importance of not delaying measures to combat cholera until identification of the vibrio, which is frequently difficult, has been achieved. In the Philippines SMITH (p. 382) reports that the finding of the cholera vibrio [*sic*] in the stools, whether agglutinable or not, is enough to warrant isolation and treatment.

In addition to vaccination, ROBERTSON and POLLITZER (p. 893) have attempted to control the water-borne cholera of the Yangtse basin by chlorination of the individual buckets of water carriers to a concentration of 0·9 p.p.m.

GENEVRAY (p. 904) reports that 13,513,350 vaccinations were carried out in Indo-China during an epidemic and considers that when fully performed it gives complete protection. The majority of these were by the single dose method, but even so appeared to be efficacious. GENEVRAY *et al.* (p. 904), unable to find any cause other than vaccination to account for the rapid disappearance of a small epidemic in Tonking, attribute this to the 980 vaccinations undertaken almost immediately after the onset. CARO (p. 383) quotes figures to show

the value of vaccination in an epidemic in Haiphong in 1937. Shortly after a large scale vaccination was carried out the epidemic began to die away and of the later cases 94 per cent. had not been vaccinated. On the other hand, VOGEL and RIOU (p. 905) record a report that spontaneous arrest of an epidemic can take place in non-vaccinated villages, and there may be recrudescence in vaccinated areas. In Annam little difference in mortality between vaccinated and non-vaccinated villages was seen. QUENARDEL further (p. 384) states that reports on the value of vaccination in Tonking have not all been favourable. *C. Wilcocks.*

TRYPANOSOMIASIS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

LESTER (p. 7) considers that large epidemics of sleeping sickness are now unlikely since contact between medical staffs and populations is close enough for outbreaks to be dealt with early. Care should be taken that control measures should fit in with general development of the countries. He reviews the disease in a number of colonies. VOGEL and RIOU (p. 8) report that 41,295 new cases were discovered in French West African colonies in 1937.

SICÉ and TORRESI (p. 9) show that *G. tachinoides* is the commonest tsetse in the French Sudan and that the disease is found mainly along the rivers Volta Noire, Bani and part of the Niger.

CORSON (p. 9) gives an account of the origin of the work he has done on the animal reservoirs of *T. rhodesiense* and on its infectivity when passed through ruminants. He (p. 10) shows that sheep infected with *T. rhodesiense* remained infective until they died but that antelopes varied considerably in their resistance; both animals would, however, had they been under natural conditions, have lived long enough for transmission to have occurred many times by flies. DUKE (p. 11) considers that *T. rhodesiense* is less adapted biologically to man and domestic animals than to game. Individual persons differ in their natural resistance to trypanosomes, and flies in their power to infect. The nature of the mammalian host may influence the pathogenicity of a trypanosome for man.

LONGLEY *et al.* (p. 12) give a technique for infecting fowl embryo with trypanosomes, various species of which can be cultivated in this manner. No change in virulence or arsenic resistance of a strain of *T. rhodesiense* so cultivated could be found. CHABAUD (p. 12) also succeeded in infecting fowl embryo with *T. brucei* and *T. equinum* but failed with *T. lewisi*. LWOFF and CECCALDI (p. 13) successfully cultivated a strain of *T. gambiense* which had been maintained in guineapigs for over a year, but found that in a culture medium containing human blood the blood of certain individuals inhibits growth, while that of others permits it. Working with *T. gambiense* and *T. congolense*, REICHENOW (p. 14) shows that *G. morsitans* may be infected by feeding upon cultures of the trypanosomes and that under certain circumstances these trypanosomes may undergo complete development in the fly.

NASH (p. 15) gives details, which cannot be further abstracted, of the breeding preferences of *G. morsitans* and *G. tachinoides* in relation to pupal density and mortality and to the microclimate of the breeding grounds.

KUNERT (p. 17), comparing the sleeping sickness seen in Tabora, Tanganyika Territory, in 1929 and in 1938, considers that the trypanosomes have increased in virulence ; infection of the c.s.f. is now earlier and glandular enlargement not so frequent, a sign that the trypanosomes more easily pass the lymphatic barrier.

LE GAC and SERVANT (p. 18) estimated the red cell resistance in human trypanosomiasis. PINARD and BRUMPT (p. 18) record an instance of long latent period in sleeping sickness. SICÉ *et al.* (p. 18) report two cases of parkinsonism in patients in the French Sudan, one of whom had trypanosomiasis. The condition is becoming more common.

BOURSNELL and WORMALL (p. 19) conclude that the long retention of Bayer 205 in the animal body is due to the combination of the drug with plasma and tissue proteins. *C. W.*

LESTER (H. M. O.). **Certain Aspects of Trypanosomiasis in Some African Dependencies.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. June 29. Vol. 33. No. 1. pp. 11–25. Discussion pp. 25–36 [O'BRIEN (A. J. R.), GORDON (R. M.), DAVEY (J. B.), CHESTERMAN (C. C.), BEVAN (Ll. E. W.) & LESTER (H. M. O.) (in reply)].

The author begins his paper by pointing out that in partially developed African dependencies wealth and general well-being depend upon population. A disease such as sleeping sickness, which decreases the population, may be a serious economic problem. In British territory the medical budget is usually about one-tenth of the total expenditure, and this can hardly be increased ; consequently, the economic side of the question is of paramount importance. Lester stresses this point because there is sometimes a tendency for the occurrence of a few cases of sleeping sickness to be regarded as a calamity. He thinks that provided there is such adequate contact between the medical staff and general population that large increases in the amounts of the disease do not pass unnoticed, there is no fear of such wholesale epidemics and depopulation as occurred in the past. Treatment is now fairly effective, and by this means alone it is possible to reduce an epidemic to reasonable proportions. Whilst constant vigilance is necessary, fear of possible fresh disasters should not lead to the imposition of unnecessarily severe and irksome restrictions.

Measures for the control of sleeping sickness ought not to interfere with general development, but should foster it as much as possible. Settlement of population in unsuitable areas may cause soil impoverishment and erosion, and vastly more damage may result from poor nutrition and famine than would have been caused by the disease.

Before going on to discuss the problems in the various African dependencies, Lester emphasizes that there is a fundamental difference between the populations of East and West Africa. In Nigeria people live in towns, villages and hamlets. A close contact between man and tsetse may cause a high rate of infection in a village, but such a community is comparatively easy to protect. In East Africa the majority live in family groups on their farms. The infection rates are therefore lower, but the scattered nature of the population makes protective measures more difficult.

The author gives a very interesting account of the present state of affairs in Tanganyika, Uganda, Kenya, the Sudan and Nigeria. He summarizes his paper as follows :—

" Although epidemic sleeping sickness may cause serious depopulation, the occurrence of a few cases should not be regarded as a calamity. Provided that there is adequate contact between the medical staff and general population there is no fear of such wholesale devastation as occurred formerly. Mass treatment of itself will reduce an epidemic to reasonable proportions. Constant vigilance is necessary, but fear of fresh disasters should not lead to unnecessarily severe and irksome restrictions.

" At present the disease is fairly mild, though patches of virulent infection occur. The proportion of severe nervous cases in Uganda, the Congo and the Sudan is not much higher than in Nigeria. Control measures should not interfere with general development. The restriction and settlement of population in unsuitable areas might cause more damage through poor nutrition and famine than sleeping sickness would have done.

" Most of Tanganyika Territory is infested with tsetse. Sleeping sickness is no longer serious as the population of infected areas has been concentrated in special settlements. There were only 168 cases in 1937. Cattle trypanosomiasis is the important problem. The fly-free areas are over-populated and overstocked. Soil impoverishment and erosion are increasing, and will continue to do so unless spread of tsetse is stopped and new areas reclaimed. A cattle assess on the four to five million cattle there would provide funds for soil and grazing control for tsetse research. A cheap and easy method of reclamation, to be used when required, is essential.

" In Uganda and the Sudan sleeping sickness is under control. The populations of the old epidemic areas have been moved to less dangerous regions. They are inspected regularly and cases treated. In both countries the restriction of population is causing overcrowding and soil impoverishment. It is hindering development and will have to be reconsidered.

" In Nigeria the disease is being controlled by mass treatment and the establishment of dispensaries, protective clearing by communal labour, and, as a last resource, the movement and concentration of population ; 300,000 cases have been treated in the last 7 years. In many of the main epidemic areas the infection rate is now a tenth of the old figure. In moving population the object is to secure the maximum improvement and development and to try to make the new settlements demonstrations for the rest of the country. People are being helped to build model compounds, and villages are being laid out properly."

The paper was followed by a discussion in which Dr. A. J. R. O'Brien, Professor R. M. Gordon, Dr. J. B. Davey, Dr. C. C. Chesterman and Mr. Ll. E. W. Bevan took part. *W. Yorke.*

VOGEL (E.) & RIOU (M.). Les maladies épidémiques, endémiques et sociales dans les colonies françaises pendant l'année 1937. Trypanosomiase. [**Epidemic, Endemic and Social Diseases in the French Colonies during 1937. Sleeping Sickness.**]—*Ann. de Méd. et de Pharm. Colon.* 1939. Apr. Vol. 37. Supplement. pp. 355–402. With 3 maps.

In the African colonies ravaged by sleeping sickness, *viz.*, French West Africa, Togo, Cameroons and French equatorial Africa, 2,770,574 people were examined in 1937 (2,977,268 in 1936), 41,295 new cases were discovered (57,162 in 1936), and 94,139 old cases have been reviewed:

In French West Africa the number of cases remains high. The situation is serious in the Ivory Coast and in Togo, although the new morbidity is falling old foci are always active. In the Cameroons the disease throughout the whole colony has been reduced to a state of feeble endemicity; there are only few epidemic foci, against which all effort in 1937 has been directed. In French equatorial Africa the endemicity is feeble and undergoing retrogression throughout the territory; it only maintains itself in a few foci, of which the two most important are those of Haute Sangha and Ouham.

It is impossible to summarize this lengthy paper, which is filled with figures of almost astronomical dimensions, showing the number of people examined, of new cases found and of early ones re-visited in the various parts of each of the French West African and equatorial colonies; those interested must consult it in the original. *W. Y.*

SICÉ (A.) & TORRESI (F.). Répartition de la trypanosomiase humaine au Soudan français. [**Distribution of Sleeping Sickness in French Sudan.**]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 560–565. With 1 folding map.

A brief account is given of the history of sleeping sickness work in French Sudan since it was first discovered by BOUFFARD in 1908. In 1933, JAMOT made a rapid survey of the territories of Tougan, Nouna, Koutiala, Ségou and Bamako; he found 1,891 cases of the disease. Subsequent missions during the following 6 years discovered 7,631 patients, of whom 6,212 were alive at the end of 1938; the mortality was thus 18·59 per cent. The patients were practically untreated during the years 1933 to 1935.

The authors then pass on to a discussion of the present distribution of the disease in French Sudan. Sleeping sickness is mainly found along the Volta Noire, the Bani, and that portion of the Niger in the vicinity of Bamako. It is thus most prevalent in those portions of the colony which adjoin the Ivory Coast and French Guinea. The distribution of the disease along the course of these rivers is dealt with in detail, and the article is illustrated by an excellent map in which the foci are plainly marked with signs indicating the intensity of the disease in the various localities. Those interested should consult the map. The paper ends with some observations on the tsetse fly responsible. Apparently *G. tachinoides* is much the commonest tsetse, but *G. palpalis* and *G. morsitans* are also found.

W. Y.

CORSON (J. F.). **A Summary of the Work of the Research Scheme on *Trypanosoma rhodesiense* during the Years 1930 to 1938.**—*East African Med. Jl.* 1939. June. Vol. 16. No. 3. pp. 84–92. [51 refs.]

This summary of the work on trypanosomiasis done by Corson during the last eight years was written at the request of Dr. R. R. Scott, Director of Medical Services, Tanganyika. The results of Corson's researches have been published in 45 articles, which have appeared in the *Journal of Tropical Medicine & Hygiene*, the *Annals of Tropical Medicine & Parasitology*, *Transactions of the Royal Society of Tropical Medicine & Hygiene*, and the *Kenya Medical Journal*. The author points out that the scheme of work was begun on the recommendation

of authorities in England who considered that experimental investigation of *Trypanosoma rhodesiense* was needed. The following programme of work was recommended in the memorandum :—

" 1. Repeated passages of *T. gambiense* through *Glossina morsitans* to domestic and laboratory animals.

" 2. Repeated passages of *T. rhodesiense* through *G. palpalis* to domestic and laboratory animals.

" 3. The study of the trypanosomes of game and their development in and transmission by the *G. morsitans* group of flies.

" 4. Epidemiological studies on *T. rhodesiense* infections and their relationship to game.

" 5. The study of the ingested blood in *G. morsitans*."

On considering this programme, Corson felt that it was best to select such questions of practical importance as seemed to offer a prospect of definite results being obtained. The third, fourth and fifth items of the above list could not well be undertaken, and the second item was not investigated since Duke's laboratory at Entebbe was better equipped to deal with it. The most useful work that Corson could undertake seemed to be the study of the question of animal reservoirs of *T. rhodesiense*, in particular to see whether *T. rhodesiense*, obtained from a sleeping sickness patient, could retain its infectivity to man during passages through ruminant animals (sheep, goats and antelopes). Pending the organization of breeding out tsetse flies, it was decided to begin this work by mechanical passages in order to show any influence of the vertebrate host on the trypanosomes, and afterwards to introduce cyclical passages by *G. morsitans*. This work was commenced in 1930, and has been the chief subject studied.

Corson then summarizes his work under the following heads :— (1) The animal reservoir question, (2) Repeated cyclical passages of *T. gambiense* through *G. morsitans*, (3) The prophylactic action of Germanin against *T. rhodesiense* in white rats, (4) Other investigations, including (*a*) Infection of domestic fowls and ducks and of francolins and guinea-fowl, (*b*) Infection of hyrax, (*c*) Dikdiks in tsetse fly areas, (*d*) The influence of cyclical passage through Glossina on *T. rhodesiense*, (*e*) Observations on tsetse flies, (*f*) *T. brucei*.

As stated previously, an account of all this work has already been published and fully noticed in this *Bulletin*. *W. Y.*

CORSON (J. F.). **The Infections produced in Sheep and Antelopes by a Strain of** *Trypanosoma rhodesiense*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. June 29. Vol. 33. No. 1. pp. 37–46.

Throughout the last 4 years Corson has conducted an experiment devised with the object of ascertaining whether a strain of *T. rhodesiense* would lose its infectivity to man during passages in ruminant animals (sheep and antelopes) and *G. morsitans*. Progress reports have appeared from time to time [this *Bulletin*, 1937, Vol. 34, p. 921 ; 1939, Vol. 36, p. 208, p. 662].

In this final note Corson deals with the infections produced in sheep and antelopes by his strain of *T. rhodesiense*. Transmission from sheep to sheep was usually made by batches of flies in boxes. The antelopes were bitten by single flies known to be infective. The sheep and antelopes were not examined very frequently or over long periods, as it was not considered to be of much importance to try to find out how long each animal remained infected. All the sheep seemed to remain infected until they died, apparently of trypanosomiasis :

the antelopes varied considerably in resistance to the infection; some seemed to resist completely, whilst others got a fatal infection. In general, it may be said that all the infected animals remained infected long enough for the trypanosomes to be transmitted many times by tsetse flies if the animals had been living under natural conditions in tsetse fly areas.

Details of the experiments are given in a series of tables, which must be consulted in the original by those interested. *W. Y.*

DUKE (H. Lyndhurst). **Remarks on Dr. Corson's Paper on the Infectivity of *T. rhodesiense* to Man.** [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. June 29. Vol. 33. No. 1. pp. 127–130.

In this note Duke makes some comments on CORSON's recent paper entitled "A Fourth Note on the Infectivity to Man of a strain of *T. rhodesiense*" [this *Bulletin*, 1939, Vol. 36, p. 208]. There are three main views about the affinities of *T. rhodesiense, viz.*, that it is a variant of *T. gambiense*, that it is a human strain of *T. brucei*, and that it is a separate species. Corson writes "I think it may be concluded that *T. rhodesiense* is a parasite not only of man but also of wild and domestic animals in sleeping sickness areas, and that it may retain its infectivity for at least several years, and perhaps indefinitely, while living only in animals and tsetse flies." Duke points out that it is not clear from this which of the three views Corson favours. He enquires whether the range of the parasite is restricted to sleeping sickness areas merely because in the absence of man its presence passes unnoticed; or because it is derived from and is really dependent on man.

Duke stresses that the evidence at present available indicates that *T. rhodesiense* is considerably less adapted biologically to man and his domestic animals than to the wild game, and he agrees with Corson that final conclusions about the game reservoir cannot be based on the behaviour of one or two strains kept under laboratory conditions.

Duke criticizes Corson's statement that "A demonstration of a loss of infectivity for a number of volunteers is therefore of less practical importance than a demonstration of continued infectivity." For various reasons he considers that "negative" evidence is just as important; any evidence of the instability of the power of *T. rhodesiense* to infect man will help us to fix its true affinities.

Corson's paper supplies ample confirmation of the conclusions reached by Duke in Uganda that individuals differ in their natural resistance to trypanosomes. Duke continues by discussing this point in some detail, and deals in particular with the question of the characteristic local reaction at the site of the infecting bite. He also gives illustrations from his own experimental cases, indicating that individuals may respond differently to the bites of infective flies, and in the light of these observations he discusses an experiment recorded by Corson, suggesting that two different flies infected from the same animal may differ in their power to infect the same man.

Duke also stresses the fact that on several occasions he has called attention to observations which suggest that the nature of its mammalian host may influence the pathogenicity of a trypanosome for man. He found that attempts to transmit from an antelope to man by cyclically infected flies might fail, whereas similar attempts to transmit

the same strain from a monkey succeeded. In view of this fact, certain of Corson's experiments, in which flies were fed on the volunteer 2 or 3 weeks after the batch was removed from the test monkey used to detect the presence of infected flies in the batch preparatory to their isolation by means of rats, are open to criticism. As Corson himself acknowledges, 2 or 3 weeks would give time for a fly to acquire infection from the test monkey, and once this becomes possible subsequent tests are open to doubt.

In conclusion, Duke wholeheartedly agrees with Corson's final recommendation, that while strains of the polymorphic trypanosomes should be thoroughly tested on man, he sees no reason to confine this investigation to areas where sleeping sickness occurs. The recognition of a human strain from antelope in such an area would not help very much, although a negative finding would be valuable. *W. Y.*

LONGLEY (B. J.), CLAUSEN (N. M.) & TATUM (A. L.). **Cultivation of Various Species of Trypanosomes in the Developing Chick Embryo.**—*Proc. Soc. Experim. Biol. & Med.* 1939. June. Vol. 41. No. 2. pp. 365–366.

It occurred to the authors to ascertain whether an arsenic-fast strain of *T. rhodesiense* would lose its resistant property after cultivation on chick embryo. In their earlier work they employed the usual window technique, but in their later experiments they used a simplified method. Eggs were incubated for 8 to 10 days. By means of a sterile dissecting needle, two small holes were made through the shell previously cleaned with alcohol. One hole was made into the air sac and the other immediately over the embryo. The inoculum consisting of highly infected rat blood was injected into the allantoic cavity by means of inserting a 26-gauge needle parallel to and immediately under the chorio-allantoic membrane. The volume of inoculum for each egg was approximately 0·5 cc. After the inoculation the holes in the shell were closed with melted paraffin. A heavy infection in embryo blood was regularly obtained, and caused the death of the embryos in 4 to 5 days.

Subcultures were made on the fifth day, and by this means the strain was maintained in chick embryo for 8 generations during a period of 41 days. No change in virulence or in arsenic-resistance occurred during this period of observation.

In subsequent experiments it was found that *T. equiperdum*, *T. brucei*, *T. evansi* and *T. hippicum* were equally readily cultivated in chick embryo for 15 days and maintained their normal virulence to rats. There appeared to the authors no reason why these strains could not have been cultivated indefinitely. *T. lewisi* was also cultivated, but not very satisfactorily because of its very slow growth. In conclusion, the authors remark that none of these species of trypanosome was infective for the hatched chick. *W. Y.*

CHABAUD (A.). Infection de l'embryon de poule par quelques trypanosomes pathogènes. [**Infection of the Chicken Embryo by Certain Pathogenic Trypanosomes.**]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 489–492.

In view of the remarkable sensitiveness of the chick embryo to certain blood spirochaetes, the author decided to see whether various trypanosomes would also infect.

The first experiments were conducted with *T. rhodesiense.* Eighty fecundated eggs were divided into 8 series and placed in the incubator for 7 to 10 days, and the allantoid membrane inoculated with 2 drops of defibrinated or citrated blood containing about 50 trypanosomes per microscope field. As a control, 10 mice were inoculated intraperitoneally and a fowl into the caruncle ; all the mice were dead in 5 days, but the fowl was resistant. The embryos inoculated with the citrated blood all became infected, as did also half of those inoculated with defibrinated blood. Parasites appeared in the embryo blood on the 4th day and reached their maximum (over 20 per field) on the 6th day, after which they progressively disappeared. The infection was passaged through a series of 15 eggs and then inoculated into a mouse, which it killed in 5 days.

Experiments with *T. brucei* and *T. equinum* gave comparable results, but attempts to infect eggs with *T. lewisi* failed. *W. Y.*

LWOFF (M.) & CECCALDI (J.). Culture *in vitro* d'une souche de *Trypanosoma gambiense* d'isolement ancien. [**Culture *in vitro* of an Old Strain of** *T. gambiense.*]—*Bull. Soc. Path. Exot.* 1939. July 12. Vol. 32. No. 7. pp. 721–726. [15 refs.]

The authors refer to the hypothesis of REICHENOW that strains of pathogenic trypanosomes which have been maintained for years by passage through laboratory animals cannot be cultured and lose their capacity of developing in the tsetse. In the present work Lwoff and Ceccaldi used a strain of *T. gambiense* obtained at Yaoundé (Cameroons) and sent to Mesnil in December 1934 ; as it exhibited little pathogenicity for mice it had been maintained in guineapigs. In January 1936, an attempt was made to infect Glossina, but only a single intestinal infection was obtained among the 51 flies used. An attempt to culture the trypanosome was made on 28th January, 1939, *i.e.* 4 years after the strain was isolated. The medium employed was that of RAZGHA [this *Bulletin*, 1930, Vol. 27, p. 244], but the infected blood was withdrawn into polyanethol sulphonate of sodium "liquoïde Roche" as an anticoagulant instead of sodium citrate, as recommended by BRUTSAERT and HENRARD [this *Bulletin*, 1938, Vol. 35, p. 704].

In the initial attempt 6 tubes were inoculated and kept at 28°C. For the preparation of the medium, in 3 of these tubes the blood of one person was employed, for that in the remaining 3 tubes the blood of a second person. On the 10th day all the tubes were positive. The second inoculation, also into 6 tubes, was made on 7th February. The blood of an individual, L., was used for the medium in 2 of these tubes, that of M. in 2 others, and that of S. in the remaining 2 tubes. Only two of the tubes, viz., those containing medium made from the blood of individual M. produced cultures.

At the 3rd passage, 6 tubes were again inoculated, but this time all the tubes contained medium made from the blood of individual A. All tubes produced rich cultures. In the 4th, 5th and 6th passages the same blood was used for the medium, and here again all the cultures were very abundant.

From this work the authors conclude that the blood of certain individuals permits the cultivation of trypanosomes, whilst that of others inhibits it. *W. Y.*

REICHENOW (Eduard). Ueber die Entwicklungsfähigkeit der Kulturformen von *Trypanosoma gambiense* und *T. congolense* in Glossinen. [**The Capacity of Culture Forms of** *T. gambiense* **and** *T. congolense* **to develop in Glossina.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. May. Vol. 43. No. 5. pp. 197–202.

In previous papers the author has drawn attention to the parallelism between the development of trypanosomes in culture and in Glossina; the flagellates develop in the same way and show the same morphological changes in both cases, and, furthermore, old strains lose the capacity both of infecting Glossina and of developing in the culture tube.

From this it might be conjectured that trypanosomes growing well in culture would also be adapted for life in the gut of Glossina, and that with cultures a higher percentage of Glossina infection would be obtained than with trypanosomes from the blood of a vertebrate.

Reichenow has investigated this problem; in his experiments he tried to infect *G. morsitans* with cultures of a strain of *T. gambiense* (As), and two strains of *T. congolense* (alt and B_1), and also with three strains of *T. gambiense* (As, D and G) maintained in laboratory animals. The flies were fed on the cultures by the usual method of inducing them to suck the material through a membrane of rats' skin.

Details of the experiments are given in full. On 12th October, 1937, 28 flies were fed on a culture of *T. gambiense* As. The culture was in the 32nd generation and was 15 months old. In all 25 flies were examined—1 on 15th October, 1937 and 6 on 16th October, 1937, all showed an infection of the mid-gut, and the parasites appeared to be in a state of multiplication; 2 flies examined on 19th October, 1937, were negative; the remaining 16 flies examined between 30th October and 5th December, 1937, were all negative; guineapigs on which the flies were fed did not become infected.

An experiment with *T. gambiense* As maintained in guineapigs was performed with 57 flies; the results showed that the trypanosomes were capable of developing in the gut of the fly but had lost the capacity of developing in the salivary glands.

Strain *T. gambiense* D isolated from man 2 months previously and maintained in guineapigs, completed its development in the fly. Strain *T. gambiense* G isolated from man 6 years and 2 months previously, and which had been shown to have become incapable of culture, was tested by feeding 9 flies on an infected rat; so far as could be judged from this very limited experiment, the parasites seemed to have lost their capacity of developing in Glossina.

Two experiments were performed in cultures of *T. congolense* strains. The culture of the first strain, *T. congolense* alt, was in its 86th generation and was $3\frac{2}{3}$ years old; it had been maintained in laboratory animals for 9 years when the culture was started. In only 1 of the 25 flies used was a permanent infection of the gut found on the 42nd day of the experiment; no proboscis infections were discovered and guineapigs upon which they were fed remained negative.

The culture of the second strain, *T. congolense* B_1, was in its 25th generation and was 1 year old; it had been maintained in laboratory animals 6 years when the culture was started. Of the 24 flies used 3 had a permanent gut infection and 2 had also a hypopharynx infection; the guineapigs on which the flies were fed remained negative however.

From this work the author concludes that cultures of trypanosomes are capable of undergoing incipient development in Glossina in approximately 100 per cent. of cases, but permanent infection of Glossina is not more easily obtained with cultures than with blood forms; nevertheless, under certain circumstances cultural forms may undergo complete development in Glossina. *W. Y.*

NASH (T. A. M.). **The Ecology of the Puparium of *Glossina* in Northern Nigeria.**—*Bull. Entom. Res.* 1939. July. Vol. 30. Pt. 2. pp. 259–284. With 6 figs. & 3 plates.

Although much study has been devoted to the seasonal fluctuations in the size of adult tsetse populations in relation to climate, no similar study has been made upon the pupal density and mortality in relation to the microclimatic conditions in the breeding-grounds. The present paper is concerned with such a study. The basic data were collected from the plain of the Katagum River near Gadau in Northern Nigeria, where only *Glossina morsitans* and *G. tachinoides* occur.

The author gives the following summary of his interesting work :—

" 1. The female tsetse extrudes her larva on soils ranging from fairly heavy clay to coarse sand; the presence or absence of organic matter seems to be immaterial.

" 2. The soil temperature varies greatly in different breeding-grounds in the dry season, but little in the rains.

" 3. The soil water content varies greatly in different breeding-grounds in the rains, but little in the dry season.

" 4. The soil water content in some of the breeding-grounds falls so low in the dry season that there can be no doubt that the atmosphere in these soils is below saturation.

" 5. Evaporation measured at 5 inches above ground-level varies little from site to site; bigger and important differences occur at greater heights above the ground where the screening effects of thicket become operative.

" 6. The seasonal changes are so great at Gadau that no one breeding-ground can satisfy the female's requirements throughout the year; instead, different breeding-places are selected for different seasons.

" 7. The cycle for *G. morsitans* is as follows: In the rains breeding occurs under palm fronds and logs in the open woodland. In the early dry season breeding continues in the open woodland, but shifts from the palm and log sites to the small thickets; breeding also starts in the more open parts of the forest islands. At the beginning of the very hot weather all the thickets of the open woodland are evacuated, and breeding is confined to the densest parts of the forest islands. In the early rains the movement is reversed: breeding shifts out into the open woodland, and in the heavy rains is confined to the log and palm sites.

" This cycle fits in closely with the cycle for the seasonal concentration and dispersal of the adult population (Nash 1937, pp. 85–90).

" 8. The major wet season breeding-ground of *G. tachinoides* is unknown, but the cycle is believed to be as follows: In the early dry season breeding shifts from the log, palm, and probably from the unknown site, to the small thickets and forest islands, and becomes maximal in the cold season. Breeding now decreases in all sites, suggesting that none is really suitable—a surmise which is strengthened when tremendous breeding activity starts in the river-bed, as soon as it becomes available at the beginning of the hot season. In the early rains this site is destroyed and breeding is believed to commence in the unknown site, as it certainly does under the logs and palms.

" 9. It seems that in very wet years *G. morsitans*, and probably *G. tachinoides*, stop breeding for a month towards the end of the heavy

rains; an almost saturated atmosphere may be the cause. A similar phenomenon was recorded in Tanganyika (Nash 1933, pp. 190–191).

" 10. After a wet season of low rainfall, when there has been no cessation of breeding, the pupal density of the dry season is much greater.

" 11. *G. morsitans* is considered to be a hardier species than *G. tachinoides*, and to be better adapted to its environment.

" 12. Broadly speaking pupal mortality is high throughout the dry season and low throughout the wet, but the cycle is as follows: Immediately after the rains the soil is damp and not too hot and very few puparia die, though the percentage mortality may be increased by the inclusion of dead puparia from the end of the rains. Mortality continues low throughout the early dry season, except under logs and palms which are becoming too hot. In the cold season mortality is everywhere higher, perhaps because the prolongation of the pupal period in an unsaturated atmosphere leads to abnormal loss in weight, which may prove fatal. In the hot season pupal mortality is high for *G. morsitans* because of the high soil temperatures in its breeding-grounds, but low for *G. tachinoides* which mainly uses the river-bed site.

" At the commencement of the rains the river-bed site is destroyed by flood and all the *tachinoides* puparia are killed; elsewhere pupal mortality decreases as the soil becomes cooler and damper. Puparia continue very healthy until the soil water content becomes maximal in the last month of the rains, when mortality either rises or breeding ceases altogether, depending upon the heaviness of the rains.

" 13. In the hot months of the dry season breeding shifts to cooler sites when the soil temperature becomes too high; pupal mortality is greatest in the hottest sites and least in the coolest.

" 14. In the wet season breeding shifts to drier sites when the soil water content becomes too high; pupal mortality is lowest in the driest sites, and highest in the wettest.

" 15. Very high mortality percentages occur in the field only when pupal density is very low, because the evacuation of the breeding-ground is almost complete before the sharp rise in mortality occurs.

" 16. It would appear from rather scanty data that mean maximum soil temperatures between 90° and 96°F. are associated with high pupal mortality, and that at higher mean maximum temperatures no puparia are to be found.

" 17. Soil water contents between 10 and 15 per cent. appear to be associated with very healthy puparia, whilst with 20–35 per cent. water contents pupal mortality is very high, and at water contents above 35 per cent. no puparia can be found.

" 18. Pupal mortality appears to be related to the absolute, not to the relative, water content.

" 19. Among the dead puparia the proportion which die late in life is much greater in the rains than in the dry season; the difference is accentuated in very wet years.

" 20. In dry earth pupal mortality will only be affected by the soil water content if it falls below the figure at which the soil atmosphere ceases to be saturated (Buxton, 1936); the figure will vary according to the nature of the soil, but even in the heavy loams of the forest islands it will have to fall below 5 per cent. before there is any possibility of the atmosphere ceasing to be saturated, and still lower in sandier soils.

" 21. The pupal period may vary greatly in different breeding-grounds in the same month, because water content and consequent evaporation has so pronounced an effect on the temperature of the superficial layers of the soil.

" 22. The short duration of the pupal period in the early rains, coupled with a very low pupal mortality and an equable climate for the emerging offspring, must make this a particularly favourable season for the rapid increase in the size of the population."

W. Y.

WILSON (S. G.). **A Note on the Fly Areas of North Nyasa District.**—*Bull. Entom. Res.* 1939. July. Vol. 30. Pt. 2. pp. 255–258. With 2 figs. (maps).

This note on the distribution of tsetse in north Nyasaland is merely of local interest. *W. Y.*

KUNERT (H.). Veränderungen im klinischen Bild der ostafrikanischen Schlafkrankheit. [**Changes in the Clinical Picture of East African Sleeping Sickness.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. May. Vol. 43. No. 5. pp. 205–209. With 1 fig.

The author records observations made by him at Tabora in 1929–30 and again in 1938, which suggests to his mind that the virulence of sleeping sickness in that district has changed.

He records that the Tabora epidemic commenced in 1927–28. KLEINE, MACLEAN, CORSON, KEEVILL and others have drawn attention to the rapid course of the disease and the relative virulence of the parasite. Kunert, who was in the Tabora district in 1927–28, had the opportunity of seeing and treating many cases. He was impressed by the quick development of the infection, the trypanosomes rapidly spreading from the blood into the lymphatic glands and cerebrospinal fluid. Enlarged cervical glands were regularly found, but a positive finding (presence of trypanosomes or increased cell count) in the cerebrospinal fluid was extremely rare before the third week; and similarly clinical evidence of disturbance of the central nervous system was likewise rare at the beginning of the disease.

Certain details are given of 6 cases seen by the author in 1927–1928. These are considered as typical of the great majority of cases encountered at that time. Examples of the information given are :—

1. Mudula. ♂, 40 years, ill two weeks; glands, cervical +++, axillary +++; blood +; cerebrospinal fluid, nil abnormal; central nervous system, nil abnormal.

5. Kamsini. ♂, 50 years, ill 3 weeks; glands, cervical ++; axillary ++; epitrochlear +++; blood +; cerebrospinal fluid, 80 cells; central nervous system, reflexes increased.

When the author returned to Tabora in 1938, he found that certain changes had occurred in the clinical picture. The vast majority of the cases failed to show enlarged lymphatic glands. A positive cerebrospinal fluid finding was often obtained even during the first few days of the illness, and clinical signs of disturbances in the central nervous system were seen very early. Details are given of 6 cases considered by the author to be a fair sample of the lot. Examples are :—

1. Asumani. ♀, 20 years, ill 10 days; glands nil; blood, scanty trypanosomes; cerebrospinal fluid, 20 cells, trypanosomes present; central nervous system, nil abnormal.

5. Hassani. ♂, 50 years, ill 16 days; glands nil; blood +; cerebrospinal fluid 206 cells, trypanosomes present; central nervous system, all reflexes increased.

The author considers the more rapid appearance of trypanosomes in the cerebrospinal fluid as evidence of increase in virulence of the parasite; and the earlier increase in cell count is evidence of the same thing. He finds further support for this hypothesis in the absence of enlarged glands, the parasites passing through the lymphatic filter. *W. Y.*

LE GAC (P.) & SERVANT (J.). Etude de la résistance globulaire au cours de la trypanosomiase humaine. [**The Red Cell Resistance in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 492–496. With 2 figs.

The resistance of the red cells to saline was examined in 70 cases of sleeping sickness; the technique used was that of VAQUEZ and RIBIERRE. The results are shown in two tables, the first dealing with cases in the first stage of the disease and the second with those in the second stage. In 37 cases (52·8 per cent.) haemolysis commenced at salt concentrations of 0·45 to 0·40 per cent., which is within normal limits. In 28 cases (40·0 per cent.) the resistance was increased somewhat, but the haemolytic point was never less than 0·30 per cent. In 5 cases (7·2 per cent.) the resistance was slightly diminished in that haemolysis was noted with a salt concentration of 0·50 per cent. *W. Y.*

PINARD (Marcel) & BRUMPT (L. C.). Considérations sur un cas de maladie du sommeil observé en France. [**A Case of Sleeping Sickness observed in France.**]—*Rev. Méd. et Hyg. Trop.* 1939. Mar.–Apr. Vol. 31. No. 2. pp. 33–36.

The patient—an African cook, aged 32—came to hospital complaining of a generalized pruritus and epileptic crises of 6 months' duration. A diagnosis of nervous syphilis was made and lumbar puncture seemed to confirm it. The Wassermann reaction was positive, as was also the colloidal benzoin reaction [see this *Bulletin*, 1939, Vol. 36, p. 253]; the protein was greatly increased (1·1 gm. per litre) and the cell count was 1,800 per cmm. The patient was then sent to the malaria therapy centre. Here the facts that the patient was an African, and that there was no Argyll Robertson pupil nor sign of paralytic dementia made the authors consider the possibility of cysticercosis or trypanosomiasis. There were some palpable cervical glands.

Interrogation revealed that the patient was born in the Loango district of Moyen-Congo in 1907. At first he was a porter, but at the age of 15 he became engaged as a cook on a ship plying from West Africa to Bordeaux. At 17 he was stationed at this place, where he lived until 3½ years ago when he left for Paris. According to this history, the patient had not been in a Glossina country for 15 years.

Further examination of the spinal fluid confirmed the previous findings, with the addition that a few trypanosomes were found in the centrifuged deposit. Examinations of the blood and bone marrow were negative, and the glands were too small to be puncturable.

The main point of interest in the case is the remarkably long latent period; in fact it was so long that the authors speculate whether the infection could not have been contracted in some other way than through Glossina. *W. Y.*

SICÉ (A.), ROBIN (Ch.) & OBERLÉ (G.). L'irritation pallidale et ses réactions dans la méningo-encéphalite trypanosomique. [**Pallidal Irritation and its Reactions in Meningo-Encephalitic Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1939. June 14. Vol. 32. No. 6. pp. 649–654.

Clinical details are given of two cases of sleeping sickness, encountered by the authors in French Sudan, both of which showed

signs of chronic meningo-encephalitis. In the first of these cases trypanosomes were found in the cerebrospinal fluid, but in the second all attempts to discover the parasites failed; both patients died. The interesting point is that they exhibited signs of Parkinsonism.

The authors point out that until recently natives presenting the Parkinsonian syndrome have hardly been met with in the endemic sleeping sickness areas. But of late they have found in villages of French Sudan a number of cases—men and women, for the most part young—of post-encephalitic Parkinsonism.

There is no doubt that African sleeping sickness does not give rise to the profound changes in the nervous system produced by other infections, and particularly by encephalitis. Henceforth it will be necessary to bear in mind the possibility of post-encephalitic symptoms in sleeping sickness work in Africa, and especially in such cases as the second of the authors' patients, in whom all attempts to discover the trypanosome failed. *W. Y.*

BOURSNELL (John Colin) & WORMALL (Arthur). **Studies on Bayer 205 (Germanin) and Antrypol. IV. The Retention of the Drug in the Animal Body.**—*Biochem. Jl.* 1939. Aug. Vol. 33. No. 8. pp. 1191–1200. With 1 fig. [21 refs.]

In previous papers a method for the determination of Bayer 205 was described, and observations were made on the persistence of this drug in the blood stream after injection into animals [this *Bulletin*, 1938, Vol. 35, p. 714 and 1939, Vol. 36, p. 668]. The experiments recorded here have been carried out to determine (*a*) whether there is any appreciable storage of the drug in the liver, kidney and other organs and tissues, and (*b*) whether persistence in the blood stream is due to combination of the drug with plasma proteins.

The authors summarize their work as follows :—

" 1. Investigations have been made to determine the cause of the long retention of Bayer 205 (or Antrypol) in the animal body after injection of the drug. In particular, the possibilities of (*a*) storage in certain organs, and (*b*) combination with plasma- and tissue-proteins have been studied.

" 2. There is no marked storage of the drug in the liver, heart, muscle, lung, brain, adrenals or pancreas of rabbits which have received one, two or three injections of Antrypol. Each of these organs, except the brain, retains a small but measurable amount of the drug, possibly in combination with the tissue proteins.

" 3. The kidneys of these injected rabbits contain considerably more Antrypol than do the other tissues examined, and the amount present (in terms of mg. drug/g. kidney) varies appreciably from one animal to another. This retention of the drug in the kidney is of special significance in view of the fairly frequent occurrence of albuminuria following the injection of the drug into man.

" 4. The spleen contains a little more of the drug than do the other organs examined, but considerably less than the kidney. Slight retention in the spleen might possibly be due to association of the drug with the reticulo-endothelial system.

" 5. Various protein fractions have been separated from the serum and plasma of injected rabbits, and from normal serum to which Bayer 205 has been added. Evidence has been obtained that plasma globulin and probably other proteins can combine (by adsorption or otherwise) with this drug.

"6. The conclusion is reached that the long retention of Bayer 205 in the animal body is due to the combination of the drug with plasma and tissue proteins."

W. Y.

PEARCE (Louise). **Tryparsamide in the Control of African Sleeping Sickness.**—*Science.* 1939. July 14. N.S. Vol. 90. No. 2324. pp. 39–40.

A semi-popular article, indicating that the outlook for satisfactory control of African sleeping sickness is now much more promising than formerly, and that this encouraging situation is directly associated with the introduction of tryparsamide therapy. *W. Y.*

YAWS AND SYPHILIS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

SIMPSON (p. 21) describes yaws in a tribe in the Cameroons. Crab yaws, sabre tibia, eye lesions and gangosa were not seen, and mucous membranes were rarely affected. Natives recognize that yaws is an old-standing disease and that syphilis is a recent introduction. DAVID (p. 22) found that only one of 26 patients with uncomplicated yaws gave a positive Kahn reaction. DEMPSTER (p. 22) shows that three injections of N.A.B. are insufficient to cure yaws.

SICÉ *et al.* (p. 22) describe three cases of gangosa.

LENTI and SERRA (p. 23) describe juxta-articular nodes in a native of the Congo. FENNER (p. 23) reports two cases of juxta-articular nodes in Australia, one in a native who had suffered from irkintja and one in a Scotswoman with a history of syphilis. DE OLIVEIRA (p. 23) also describes a patient with juxta-articular nodes but was unable to decide whether they resulted from yaws or syphilis.

The yaws-syphilis controversy is discussed by a number of authors. HASSELMANN (p. 24) in experimental work on monkeys found that whereas *Sp. pertenuis* cannot live except in ectodermal tissues, *Sp. pallida* is panblastotropic. The secondary lesions in yaws resemble the primary, but in syphilis this is not so. The primary lesions in injected *M. cynomolgus* are distinguishable, yaws producing a framboesial papilloma and syphilis a sclerotic lesion. In gangosa the yaws lesion spreads from the surface inwards, in syphilitic perforation it spreads from the deep to the superficial parts. RAJAM (p. 25) reports a case in which yaws of long standing failed to protect against syphilitic infection. TODD (p. 25) recognized syphilitic rupia in a child in Nigeria thought to be suffering from yaws and found a hard chancre on the genitalia, probably originating from syphilitic infection during circumcision.

SLAMET SUDIBYO (p. 25) found changes in the cerebrospinal fluid only in the secondary stage of yaws and concludes that lesions of the central nervous system comparable with tabes and general paralysis do not occur. On the other hand BOTREAU-ROUSSEL (p. 26) diagnosed tabo-paresis in a native of the Ivory Coast and considers it to have been due to yaws [but the evidence appears to be very incomplete].

ISWARIAH and NAIR (p. 26) describe an epidemic of an infection with a spirochaete indistinguishable from *Sp. pallida* and characterized by sores at the angles of the mouth with adenopathy in women and girls in India. The Wassermann was positive and the authors discuss the nature of the disease, pointing out the similarity to bejel.

C. W.

SCOTT (C. J.). **Yaws: a Further Report on the Robinson Deep Occurrence.**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1939. Apr. Vol. 18. No. 206. pp. 151–155. With 4 figs.

In this *Bulletin* 1933, Vol. 30, p. 595 an article, embodying some particularly interesting observations by Dr. C. J. Scott upon yaws as it occurred among workers in a Johannesburg mine, was reviewed.

The article now presented is prefaced by a note. This report obviously written for submission to the Transvaal Mine Medical Officers' Association was found amongst the papers of the late Dr. Scott. The paper however contains little that is new beyond a statement of the number of cases of yaws occurring in the years 1934–1937.

H. S. Stannus.

SIMPSON (T.). **Yaws and its Treatment in the Bamenda Division of the Cameroons under British Mandate.**—*West African Med. Jl.* 1938. Oct. Vol. 10. No. 1. pp. 14–34. With 39 figs. on 8 plates.

A long paper giving an excellent description of yaws in the northern province of the Cameroons, with a number of very good photographs. There is nothing new in the observations made but they serve to confirm previous views on yaws.

Of 30,000 cases of yaws in the province clinical studies were made upon 920, all of the Wum tribe, among whom the disease occurs in 100 per cent. Among these people of whom the men only wear a strip of cloth over the pudenda and the women and children nothing, one of the commonest sites for the primary lesion is on the genito-perineo-natal area and inner side of thigh, these sites being very rare among the clothed tribes of S. Nigeria. These are sites of common skin infections in the unclothed causing scratching, thus confirming liability-to-trauma as a potent site factor.

Crab yaws was never seen, no case of sabre tibia was encountered. No eye lesions occurred, but 4 cases of J.A.N. and 1 of goundou (she stated that she had never had yaws) were noted, also 21 cases of ganglion of the flexor and extensor tendons of the wrist and forearm. No case of gangosa was met with among the 920 Wum people, but 55 cases from adjoining areas, all except three with a history of yaws, were observed. Syphilis could not be excluded in these cases.

"The mucous membranes are rarely affected" the author states, "the primary yaw if situated on the labia may extend into the vaginal mucous membrane" just as a lesion on the lip or about the nostril may extend across the mucocutaneous border. Among 725 cases in which routine examination of mucous membranes was made 23, in the late secondary stage, showed whitish patches on the tonsils, soft palate, uvula, or posterior pharyngeal wall, replaced later by "pale bluish ulcer patch." The part played by the soil, rainfall, humidity and vegetation is in conformity with previous observations.

There was a seasonal increase in the number of cases with the rains, and flies (muscids) might play a part in transmission.

While the author hesitates to make up his mind concerning the relationship of yaws and syphilis, his trained native assistants state that while yaws is as old as the hills so to speak, syphilis is of recent introduction in neighbouring areas, that the two diseases are quite distinct and should never be mistaken. *H. S. S.*

DAVID. Note sur la réaction de Kahn dans le pian et la malaria. [**The Kahn Reaction in Yaws and Malaria.**]—*Bull. Méd. du Katanga.* 1938. Vol. 15. No. 1. pp. 7–9. [Summary appears also in *Bulletin of Hygiene.*]

The author had in mind the discovery of cases of inapparent syphilis among women living in the rural parts [of Katanga]. Finding that a considerable number of them gave a positive Kahn reaction he examined cases of yaws and of subtertian malaria to determine whether some at least of the reactors might be suffering from these and not from syphilis. The numbers of yaws cases (27) and of malaria (6) are too few for valid induction but may be of some interest. Of the yaws patients six were in the primary, two in the secondary and 19 in later stages. Two gave a positive reaction: one a man of 25 years with primary yaws. He had no brothers or sisters, and his parents were dead; he himself showed no signs of either congenital or acquired syphilis. The second was a woman of 35 years with a painless ulcer in the sole; she had had two miscarriages. Subsequent questions revealed that she had had syphilis. With one exception, therefore, among those examined, uncomplicated yaws did not give a positive Kahn reaction. All six malaria patients proved negative.

H. H. S.

DEMPSTER (G.). **Treatment of Yaws studied Serologically.**—*New Zealand Med. Jl.* 1938. Dec. Vol. 37. No. 202. pp. 338–342.

A short article reporting the results of serological tests (Kahn) in some two dozen cases of yaws at different stages, drawn from the Yaws Clinic, Apia, Samoa, in 1936–37.

The evidence from such a small series of itself would be of little value but it goes to confirm the findings of others, namely that the common method of treatment by means of a course of three injections of N.A.B. is wholly insufficient to cure. Little effect is produced on serological reactions, recurrences are frequent and treatment more difficult in relapse. *H. S. S.*

SICÉ (A.), POUDEVIGNE (H.) & BERTHON (H.). Contribution à l'étude pathogénique de la rhino-pharyngite ulcéreuse et mutilante (gangosa). [**On the Pathogeny of Gangosa.**]—*Bull. Soc. Path. Exot.* 1939. July 12. Vol. 32. No. 7. pp. 716–720. With 2 figs.

Observations upon three cases of gangosa, two in natives of the southern zone of French Sudan near the border of the Ivory Coast, and one of French Guinea. In all three, one a woman of 20 years, another an infant of 18 months, the third an adult male, the process began as a lesion situated at the posterior border of the anterior naris.

In two cases secondary framboesial lesions were present on the body, in the case of the woman there was a history of past yaws.

The authors appear to believe that any lesion in this position, framboesial or otherwise, may ulcerate and become phagedaenic with the production of gangosa. Treatment by means of bismuth and arsenic given to the woman was followed by excellent result.

H. S. S.

LENTI (Pietro) & SERRA (Giovanni). Lesioni terziarie da Spirocheta pertenue "nodositas juxta-articularis." [**Juxta-articular Nodules in Tertiary Yaws.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1939. May. Vol. 20. No. 5. pp. 273–297. With 12 figs.

The authors describe fully a single case of J.A.N., seen by one of them in the Belgian Congo—a native male aged 50 with a history of yaws at seven years of age which lasted eighteen months followed by two years of fever and periarticular pain. The nodes appeared at the age of thirty and took ten years to reach their size when seen; they were typical of their kind. The W.R. was positive. The nodules were easily shelled out. Histologically they did not differ from those found in other cases.

The rest of this rather long article consists of a summary of the findings of some other observers, all of which have been dealt with in this *Bulletin.* *H. S. S.*

FENNER (Frank J.). **The Occurrence of Juxta-articular Nodules in Australia.**—*Med. Jl. Australia.* 1938. Sept. 10. 25th Year. Vol. 2. No. 11. pp. 412–417. With 4 figs. (2 on a plate). [34 refs.]

The author writing from the University of Adelaide describes two cases of J.A.N.—which he believes to be the first reported from Australia. One was a male native aged 65 who had signs of having suffered from "irkintja," the disease which has been identified with yaws.

The second was a 53-year-old Scotswoman who had never resided in the tropics but had lived in Australia 25 years; there was a history of syphilis in the husband. The cases were typical with multiple nodules and positive W.R. in each. In the woman, however, some of them broke down. The pathological picture obtained by sectioning excised nodules was also typical. In the woman the nodules almost entirely disappeared under antisyphilitic treatment.

The rest of the article consists of a summary upon the subject of J.A.N. largely extracted from this *Bulletin.* *H. S. S.*

DE OLIVEIRA (Paulo). Nodosidades juxta-articulares de Lutz-Jeanselme. [**Juxta-articular Nodules.**]—*Brasil-Medico.* 1938. Oct. 15. Vol. 52. No. 42. pp. 943–947. With 6 figs. [14 refs.] English summary (9 lines).

The fact is well known that the serum of patients with juxta-articular nodules gives a positive Wassermann reaction; hence the belief that these are syphilitic in origin. The present case is an instance of the difficulty of deciding whether these nodules are a sequela of yaws or are a syphilitic manifestation. The patient was a man of 35 years

who could not say whether or not he had suffered from yaws. He had certainly had several attacks of venereal disease, gonorrhoea and three times a chancre, for one of which he received a course of mercury injections. He presented twelve nodules on hands, elbow and feet. Wassermann and Kahn reactions were both positive with his serum, negative with the spinal fluid. Clinical cure was obtained with neosalvarsan and bismuth. *H. H. S.*

HASSELMANN (C. M.). Zur Klinik, Symptomatologie und Loimologie von Framboesie und Syphilis. [**The Clinical Features, Symptomatology and Pathology of Yaws and Syphilis.**]—Reprinted from *Berichte d. Phys-Med. Gesellschaft z. Würzburg. N.F.* 1937. Vol. 61. pp. 51–69. With 14 figs.

This appears to have been delivered as a lecture accompanied by illustrative photographs, several of which have been reproduced and certainly demonstrate various framboesial conditions very clearly. The author defines "loimologie" as "epidemiology and endemiology," but it covers, in this case, more than these ; it goes into the question of the pathological differences between yaws and syphilis.

He reviews his experiences and his experimental work carried out in collaboration with SCHOEBL on *Macacus cynomolgus*. He shows that virulent *Sp. pertenuis* may be found, caught up in the lymph glands regional to the primary lesion and that, when the latter has healed, living spirochaetes are no longer to be found and they can neither increase nor live in the mesodermal lymphatic gland tissue—in other words the *Sp. pertenuis* is ectodermotropic. *Sp. pallida* on the other hand attacks all three embryonal layers—it is panblastotropic. In a little more detail, in yaws the inflamed tissues are increasedly vascular, but there is never any marked affection of the intima or media, thence no proliferation of these leading to obliteration and so to necrosis. In syphilis on the other hand such changes do occur leading to the production of a " hard chancre." If untreated the yaws in 10–12 weeks gives rise to generalized, metastatic papillomata each showing the same changes as the primary focus, in contrast with secondary syphilomata which are not " generalized chancres." Later still, the " efflorescent patches " of yaws ulcerate or harden to a keratoderma of palm or sole—a hyperkeratosis. The presence of secondaries all resembling the primary lesion, and occurring simultaneously, is practically diagnostic of yaws but, he maintains, injection of *M. cynomolgus* will settle the question of diagnosis for, in yaws, the initial lesion will be a typical framboesial papilloma, in syphilis an indurated, sclerotic lesion.

Again, gangosa and syphilitic perforation may resemble one another, but the history will reveal that the syphilitic process spread from the deeper parts to the superficial, whereas in yaws it arose from the surface and spread to the deeper parts—the necrotic process extended from the cutaneous layer. Other points are mentioned such as that transplacental infection in yaws is unknown and hence congenital yaws has not been recorded. He shows a good photograph of juxta-articular nodules of the malleoli and he thinks that juxta-tendineal is a more correct term. Even if little that is new is adduced, the article is an excellent summary of Dr. Hasselmann's views.

H. H. S.

RAJAM (R. V.). **Report of a Case of Early Acquired Syphilis in a Patient with Tertiary Stigmata of Untreated Yaws.**—*Indian Med. Gaz.* 1938. Dec. Vol. 73. No. 12. pp. 735–736. With 1 text fig. [Summary appears also in *Bulletin of Hygiene.*]

The patient was a man of 39 years with the following history. He came from Cochin State, where yaws is endemic. At the age of 10 years he developed an indolent sore at the back of his neck and for the next 8 years suffered from multiple recurrent sores which were not treated and had left puckered, thickened scars on arms, shoulders, buttocks, legs and feet and he was very crippled.

Two and a half months before he came under the author's observation he had exposed himself to the risk of venereal infection and a penile sore developed fifteen days later followed in 8 weeks by a papular syphilide. There were no indications of congenital syphilis. The Kahn and Wassermann reactions with his serum were positive and the *Sp. pallida* was seen by dark ground examination of fluid from the chancre. The sore and the rash cleared rapidly when antisyphilitic treatment was instituted. Clearly the long-standing yaws had failed to confer any immunity against the subsequent syphilis [see also CHAMBERS, H. D., this *Bulletin*, 1937, Vol. 34, p. 959]. *H. H. S.*

i. TODD (K. W.). **Yaws and Syphilis : Genital Chancre in a Boy of 6 Weeks.** [Memoranda.]—*Brit. Med. Jl.* 1939. Apr. 22. p. 827.
ii. BLACKLOCK (D. B.). **Yaws and Syphilis.** [Correspondence.]—*Ibid.* May 13. pp. 1004–1005.

i. The author's suspicions in the case of a Nigerian boy 6 weeks old thought to be suffering from yaws, were aroused by the fact that scabs had fallen off and left dry depressed beds, which reminded him of rupia, and that scabs still present were not piled so high as usual in yaws. There was a hard chancre with a rolled edge on the genitalia which probably originated from circumcision, performed by a native, in the course of which the child was infected. This recognition of rupia is an argument against the identity of yaws and syphilis.

Referring to the fact that congenital yaws is not found, the author quotes two cases of florid yaws existing in women at the time of confinement. The children remained perfectly healthy, but unfortunately blood for serum was refused. Florid yaws may not be so rare in pregnant women as is thought.

ii. In a comment Blacklock points out that the rupia of syphilis is a late secondary manifestation and that, assuming the eruption in TODD's case to be rupia " the extreme precocity of its incidence makes it quite unlike the rupia which syphilologists in Europe, America and this country [Britain] describe as syphilitic." *C. W.*

SLAMET SUDIBYO (R. M.). Vergelijkend onderzoek van de liquores bij framboesia tropica en syphilis. [**Comparative Investigation of the Cerebrospinal Fluid in Yaws and Syphilis.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Jan. 31. Vol. 79. No. 5. pp. 284–305. [15 refs.] English summary. [Summary appears also in *Bulletin of Hygiene.*]

" 1. The still existing difference of opinion about the frequency in yaws of lesions of the central nervous system resembling tabes dorsalis or general paralysis leads me to re-investigate this problem.

" 2. For this purpose a comparative study of the cerebrospinal fluid was made in 123 syphilis patients and 101 yaws patients.

" 3. In the 123 syphilitic cerebrospinal fluids changes were found in all stages of the disease, viz. S.I : 8·3 per cent. ; S.II : 35·7 per cent. ; S-latens : 20·7 per cent. ; S.III : 42·8 per cent.

" 4. These percentages of cerebrospinal fluid changes in syphilis patients (almost every one of which belonged to the Asiatic groups of population living in the Netherlands East Indies), generally agree with the figures for Dutch sufferers from syphilis, found by VAN DER VALK.

" 5. In the cerebrospinal fluid of 101 yaws patients changes were found in the secondary stage, viz. 14 per cent., while no changes were found in the latent and tertiary stage.

" 6. The changes of the cerebrospinal fluid in yaws are not so pronounced as those of the cerebrospinal fluid in syphilis and have to be considered as a passing reaction of the cerebrospinal fluid (meninges) upon the general yaws infection.

" 7. The time necessary for the changes of the yaws cerebrospinal fluid to stabilize need not be equally long, may even be longer than the time needed for the stabilization of the syphilitic cerebrospinal fluid alterations fixed by most investigators at 3 to 4 years.

" 8. In cases of yaws we found no changes in the cerebrospinal fluid after the third year of the disease.

" 9. From the results of our investigations we conclude that no definite evidence can be presented of development of central nervous system lesions in yaws, which resemble the tabes dorsalis and general paralysis of syphilis."

BOTREAU-ROUSSEL. Formes tabo-paralytiques du pian. [**Tabo-Paresis in Yaws.**]—*Marseille-Méd.* 1939. June 15. Vol. 76. No. 17. pp. 793–794.

In 1916 the author examined a male native of 14 years on the Ivory Coast who presented a hypertrophic osteitis of the mandible which had come on in childhood due to yaws. He was a promising scholar. Twenty years later he again came across this individual, now aged 34, he looked like an old man, and was under detention for petty crimes over many years.

The man exhibited a tabetic gait with motor incoordination, absent knee-jerk, inequality of the pupils but no Argyll-Robertson phenomenon, no nystagmus, no tremor and no change in speech, etc.

On these admittedly incomplete findings a diagnosis of taboparesis of framboesial origin is tentatively put forward. [It is a long way from proving it to be a case of taboparalysis due to yaws.] *H. S. S.*

ISWARIAH (V.) & NAIR (V. G.). **Endemic Non-Venereal Syphilis—Bejel (?).**—*Jl. Indian Med. Assoc.* 1938. Sept. Vol. 7. No. 12. pp. 651–654. [Summary appears also in *Bulletin of Hygiene.*]

The authors of this paper report in it an epidemic of an infection with an organism morphologically indistinguishable from *Sp. pallida* which affected a number of the women and children of a fishing village of about 600 inhabitants about 4 miles from Vizagapatam on the coast of Madras. The cases first came to the authors' notice in October 1937 and appear to have originated with a girl of 10 who a year previously had returned to the village from a visit to a place about 20 miles distant suffering from sores at the angles of her mouth ; after that the same condition was stated to have spread rapidly through the village. Of the infected cases approximately 70 per cent.

were adult women and the remainder children ; " adult men and boys over twelve were singularly free." The chief lesions were ulcers at the angles of the mouth spreading an inch or so into the buccal mucous membrane. Cervical and posterior auricular glands were enlarged and in a number of cases there was a general adenopathy. In only one was there any rash on the body, in the form of scaly patches, but amongst the children were some with vulvar, perianal, or/and preputial lesions which were sometimes like condylomata and sometimes ulcerative. The secretion of the mouth lesions showed organisms indistinguishable from *Sp. pallida* and the Wassermann reaction was ++ in 29 out of the 32 cases under the authors' care and + in the remaining 3. The authors discuss the question of this disease being syphilis or yaws or a separate condition such as Bejel as described by HUDSON [assuming that Bejel is a separate condition] to which it seems to be remarkably similar. They review the principal articles in the literature on the controversial subject of the identity or non-identity of yaws and syphilis, but beyond saying that the condition in their patients was clinically not like yaws, they seem to leave the decision open. [See *Bull. of Hyg.*, 1936, Vol. 11, p. 908 ; 1937, Vol. 12, pp. 117, 773, and this *Bulletin*, 1936, Vol. 33, p. 966 ; 1938, Vol. 35, p. 822.]

L. W. Harrison.

SPRUE.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

GORE (p. 28) reports that certain haemolytic bacteria are found in the faeces in sprue and this fact may be useful in diagnosis. He suggests a dietary deficiency as the principal cause of sprue and that this permits the survival of the organisms. SUÁREZ (p. 28) sums up his views on sprue. He believes that the hereditary factor is important and that idiopathic steatorrhoea and sprue are the same disease. A dietary deficiency is apparently present in Porto Rico. BAUER (p. 29) also regards tropical sprue, idiopathic steatorrhoea and coeliac disease as identical. He comments on symptoms indicating functional endocrine disturbance in one patient who improved on a high vitamin diet with liver extract.

The association of sprue with gastro-colic fistula is described by MOHR (p. 30) in a patient who had lived in the east. PERDOMO HURTADO (p. 30) gives an account of a case. SPRENG (p. 30) claims a diagnosis of sprue in a tuberculous pregnant woman.

POCK-STEEN (p. 31) describes a syndrome ascribed to tissue anoxaemia due to histamine toxicosis and having many features in common with sprue. Liver extract and vitamin preparations gave relief in seven cases.

A review of the treatment of sprue is given by TOULLEC and RIOU (p. 31). ROGERS (p. 31) who has for many years thought that a streptococcus played a part in the aetiology of sprue, has obtained success in treatment with prontosil combined with liver extract. Without claiming too much he advises a further trial of the prontosil group. JUSTIN-BESANÇON *et al.* (p. 32) report benefit in tropical sprue by treatment with nicotinamide. They (p. 33) point out resemblances

between sprue and pellagra. The administration of nicotinic acid to two women with idiopathic steatorrhoea caused improvement in the diarrhoea but not in the other symptoms when used by BING and BROAGER (p. 33). FUCHS and WISSELINCK (p. 33) successfully treated a patient with nicotinic acid but analysis of the symptoms points to a diagnosis of pellagra and not, as the authors claim, to sprue.

In discussing four cases of steatorrhoea BRULL *et al.* (p. 34) conclude that the condition is due to multiple avitaminosis associated with reduction of the digestive secretions. In comment SCOTT points out the present unsatisfactory nomenclature of this and similar conditions.

HOLMES (p. 35) describes chronic diarrhoea associated with osteomalacia. Against the diagnosis of sprue was the absence of anaemia and steatorrhoea. FROSTAD (p. 35) and BURGDORF and BARRY (p. 35) describe cases of steatorrhoea. *C. W.*

FOURNIALS. La sprue. [**Sprue.**]—*Les Grandes Endémies Tropicales.* 1938. Vol. 10. pp. 53–75.

Sprue would naturally be expected to bulk largely in a work on tropical endemic diseases. In the section dealing with this subject a great opportunity has been allowed to slip. In a French work one admits that ample justice should be done to French workers, but science is international and British investigators have done as much as any and more than most to throw light on this obscure subject. In the present article, however, they are almost completely ignored and no mention is made of their studies in the past decade or so and consequently the author has dealt chiefly with old theories and the article becomes one of historical interest mainly, if not entirely.

H. H. S.

BOMBAY: REPORT OF THE HAFFKINE INSTITUTE FOR THE YEAR 1938 [SOKHEY (S. S.), Director].—**A New Group of Bacilli associated with Sprue and Pernicious Anaemia** [GORE]. p. 53.

The author tells of certain haemolytic bacteria which he has found, it would appear to be in the intestinal contents, in cases of sprue and pernicious anaemia. Although he finds the organism in cases of sprue the author does not commit himself to the opinion that it is causative but, at the same time, used the fact as a diagnostic aid. He suggests that the disease is primarily the result of dietary deficiency which brings about changes which in turn promote or at least permit the survival of this organism. It is common in water and sewage. Beyond stating that the organism, or group of organisms, is haemolytic and produces H_2S in litmus milk culture, its characters are not described in this report. *H. H. S.*

SUÁREZ (Ramón M.). **Clinical and Hematological Review of Sprue based on the Study of 150 Cases.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1938. Dec. Vol. 14. No. 2. pp. 157–175. With 2 figs. [18 refs.] [Spanish version pp. 176–197.]

In a review one does not look for—it would be wrong for one to expect—anything new and readers bearing this in mind will find much of interest in this article. Again, a critical review naturally bears the impress of the reviewer's predilections. In stating that

"authenticated cases of sprue have been reported from temperate climates developing in individuals who had never visited the tropics . . . the disease, formerly regarded as tropical, has become cosmopolitan" Dr. Suárez seems to take for granted that the so-called idiopathic steatorrhoea of non-tropical countries and tropical sprue are one and the same, a proposition which has many opponents. Again, it is strange that among 150 cases of tropical sprue, though many complained of cramps, none showed signs of typical tetany, either spontaneous or induced. [In the abstractor's case, if a personal reference may be pardoned, though cramps were common and painful, true tetany proved for a time very troublesome; occasionally attacks occurred spontaneously, but during a period of months could be induced in the hands by attempting to write a note.] As regards the hereditary factor, in which the author believes, many cases occur in persons whose parents have never been in the tropics or who, if they have, have not "suffered from pernicious anaemia or sprue." Heredity cannot play any large part.

The author shows that the diet of the Porto-Rican is much deficient in Vitamin A, and low also in calcium, phosphorus and fat, and mentions that some cases benefit when vitamin B is administered. The haematological studies have proved of little value for the limits, at all events in these 150 cases, are too elastic. Thus, the erythrocytes ranged between 690,000 and 4,410,000 per cmm., haemoglobin between 2·4 and 14·8 gm., or 16·5 and 102 per cent., the colour index between 0·6 and 2·2, leucocytes between 1,550 and 13,600 per cmm. [it is not said whether there was any complication to account for this leucocytosis]. The results of examination of the sternal marrow are interesting and the author sums up well the rationale of present-day treatment.

H. H. S.

BAUER (Julius). **Endocrine Aspects of Sprue: their Relation to the Pituitary Syndrome in Anorexia Nervosa.**—*Jl. Trop. Med. & Hyg.* 1939. Aug. 15. Vol. 42. No. 16. pp. 245–250. With 3 figs. [25 refs.]

The author is in agreement with THAYSEN in regarding tropical sprue, idiopathic steatorrhoea, coeliac disease as all one and the same; this is stated as a fact and is not discussed. He goes on to record a case in which certain symptoms—which are also found in some sprue patients—are indicative of endocrine disturbance. The patient was a woman of 52 years, admitted into the Charity Hospital, Louisiana, New Orleans, complaining of diarrhoea, weakness, shortness of breath, nausea, sore tongue and mouth, and occasional dizziness, and cramping pains in legs and arms. Blood calcium was 6 mgm. per cent. She improved on treatment with liver extract, high vitamin diet and vitamins A, B_1, B_2 and C in tablets and left hospital in 15 days having gained 19 lb. in weight. The author compares the signs present in his patient with those observed in cases of impairment of function of the anterior lobe of the pituitary—in particular a tendency to secondary hypoglycaemia and excessive response to a small dose of insulin—which occur in some cases of idiopathic steatorrhoea. He comments on the absence of tetany in his patient, in spite of the low calcium content of the blood, stating that "it is not the lack of calcium in the blood, but apparently the lack of calcium in certain parts of the central nervous system which is responsible for the symptoms of

tetany," but it is to be noticed that the patient did complain of cramping pains in legs and arms. [It is to be noted that the author lays stress on the *functional* impairment of the anterior pituitary, as SCOTT (to whom he refers) did as regards the parathyroids, though the latter has been constantly misrepresented and his views combated on the ground that microscopical examination in fatal cases reveals no *structural* changes.] *H. H. S.*

MOHR (Werner). Symptomatische Sprue bei gastrokolischer Fistel. [**Gastro-colic Fistula with Sprue-like Symptoms.**]—*Deut. Med. Woch.* 1939. Feb. 24. Vol. 65. No. 8. pp. 287–289. With 4 figs. [15 refs.]

This is an important communication, well described. Briefly stated the patient presented a condition bearing certain resemblances to sprue—foamy diarrhoea, loss of weight, a flat sugar curve, a ratio of neutral fat to fatty acids in the stool of 1 to 3. There was, however, no glossitis or stomatitis ; the anaemia was not great, 3·5 million red cells, haemoglobin 70 per cent., colour index 1 ; no macrocytosis mentioned. Operation revealed a fistulous communication between the stomach and the transverse colon, and when this was closed the symptoms began to clear.

There were many reasons in this case to support a diagnosis of sprue. The patient had lived abroad, in China and elsewhere, had suffered from dysentery—a frequent precursor of sprue—from other dietetic diseases, beriberi and scurvy, and from liver abscess. [The author comments on the absence of osteoporosis as militating against the diagnosis of sprue, whereas its presence is more characteristic of idiopathic steatorrhoea.] *H. H. S.*

PERDOMO HURTADO (B.). Sprue y anemia de tipo pernicioso consecutiva. [**Sprue and Secondary Anaemia of the Pernicious Type.**]—*Gac. Med. de Caracas.* 1938. Sept. 30. Vol. 45. No. 18. pp. 274–277.

This is a general account of sprue illustrated by the case of a man 59 years of age who at intervals had presented symptoms for eleven years. Blood examination gave red cells 2,420,000 per cmm., haemoglobin 76 per cent., colour index 1·6. No mention is made of any anisocytosis, poikilocytosis, or erythroblasts and the " pernicious type " of anaemia was diagnosed on the high colour index. There is nothing special to record concerning this case ; the treatment and its theory are discussed. *H. H. S.*

SPRENG (A.). Einheimische Sprue und Schwangerschaft. [**Non-Tropical Sprue and Pregnancy.**]—*Schweiz. Med. Woch.* 1939. Feb. 18. Vol. 69. No. 7. pp. 150–151.

A case of steatorrhoea in a patient already tuberculous. The blood showed a macrocytic anaemia, colour index 1·1, and calcium 7·2 mgm. per cent. The blood count is not stated, nor any analysis of the stools, beyond the bare statement that fat was increased. The author speaks of osteoporosis being present, but elsewhere says " there was no doubt of the diagnosis of sprue," whereas in true sprue osteoporosis is not seen. The patient was delivered of triplets and after that

improved gradually but slowly. [The case was very likely one of interference with absorption, from abdominal pressure, perhaps associated with enlarged glands (though this is not mentioned), for the patient was tuberculous and bronchiectatic.] *H. H. S.*

POCK-STEEN (P. H.). Klinische observaties. I. Het symptoom der "vergeten ademhaling." [**Clinical Studies. I. The Symptom of "Forgetting to Breathe".**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Vol. 79. pp. 727–748. [Summary taken from *Nutrition Abstracts & Reviews.* 1939. July. Vol. 9. No. 1. p. 166. Signed I. LEITCH.]

A syndrome is described in 57 cases characterised by slow respiration interrupted by deep sighs. Blood pressure was low, red cell count high with normal or low Hb; blood sugar low; peripheral hyper-irritability was always present; almost all cases showed mydriasis, photophobia and "twilight blindness"; nervous symptoms, in the form of anxiety and over-excitability, were universal with increasing weakness and psychic disinclination for exertion; severe cramps occurred. The faeces always showed a high fat content. In some cases, severe anginal pain occurred at times.

The condition is considered to be one of tissue anoxaemia due to histamine toxicosis, and to have many features in common with sprue. Exercise, if persisted in, gave relief lasting for days. Injection of liver extract with administration of Fe and vitamin C was beneficial in some cases. Injections of liver extract and lactoflavin, or of cortin, lactoflavin and ascorbic acid together gave relief in severe cases. Heart stimulants were without effect.

TOULLEC (F.) & RIOU (M.). Le problème thérapeutique de la sprue. [**Sprue and its Treatment.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Aug.–Sept. Vol. 20. No. 7. pp. 829–867.

This is an excellent review of the subject to the present day, and discusses treatment from the aspects of general régime, of diet, of vitamins, of organotherapy, and symptomatic and prophylactic treatment. No fresh research on the part of the authors is included; names are quoted frequently in the text as authority for statements made, but dates are not given and there is no bibliography, so that it is almost impossible to look up the original papers from which quotations or opinions are stated. Those wishing to become *au courant* with the present state of this interesting problem would do well to read the article at length.

[There are a few misprints, one of the most unfortunate being Faileyr for the name of probably the soundest authority on the dietetics of sprue.] *H. H. S.*

ROGERS (Leonard). **The Use of Prontosil in Sprue.** [Memoranda.]—*Brit. Med. Jl.* 1938. Nov. 5. pp. 943–944.

Though in dealing with a disease such as sprue, which exhibits intervals of improvement varying in duration, we must be cautious in interpreting *post hoc* as *propter hoc*, when success follows a certain line of treatment, the use of prontosil suggested by Sir Leonard Rogers has

a rational basis and is consequently worthy of further trial. Sir Leonard Rogers has for nearly a quarter of a century favoured a streptococcus as playing a part in the aetiology of the symptom-complex of sprue. From time to time since 1914 he has recorded patients benefiting from the use of autogenous streptococcal vaccines and in 1920 compared forty-four in Calcutta so treated with forty-five others in the Calcutta European hospital. Among the latter five only made a marked improvement, whereas among the former twenty-one recovered (eighteen remained well for over a year) and thirteen others improved greatly. Since dietetic treatment was adopted at the same time it is not safe to ascribe too much to the vaccines, but the contrast is most suggestive.

The author now reports the case of a man over 80 years of age who has suffered for some years from sprue. Recently his condition became serious, accompanied by fever and some degree of bronchitis and a fall of haemoglobin to 48 per cent.; stools numbered up to seven daily. He was given injections of liver extract and prontosil rubrum *per os*. The temperature dropped, stools diminished to two or three daily, and the soreness of the mouth lessened. Again, since liver extract was also given and, presumably, the diet was carefully regulated, it is difficult to assess the part played by the prontosil, but in view of the former benefit from streptococcal vaccines and the knowledge that prontosil acts on streptococci, its further trial is clearly called for. If it does no more than relieve the troublesome and exceedingly painful stomatitis and glossitis it will not be given in vain. *H. H. S.*

JUSTIN-BESANÇON (L.), CAROLI (J.) & INBONA (J. M.). Action de l'acide nicotinique dans un cas de sprue. Étude clinique. [**Nicotinic Acid in Sprue.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1939. July 17. 55th Year. 3rd. Ser. No. 24. pp. 1135–1141.

A man, 56 years old when seen by the authors in 1936, had lived in various warm countries, the Amazon, Netherlands Indies and Venezuela and returned to Europe in 1930. The following year, in spite of there being no record of illness while he was abroad, he developed symptoms typical of tropical sprue. He submitted to the usual forms of treatment—dietetic, vitamin D, iron and calcium gluconate intravenously, stovarsol, kaolin, bismuth and so forth—without benefit. In April 1937 he was given liver extract and improved considerably and left hospital, but in a little less than two years he was back again; the improvement lasted for 14 months. In March 1939 all the symptoms had returned; he was given nicotinamide 1 gm. thrice intramuscularly from 29th March to 12th April—no benefit; then liver extract for 5 days and nicotinamide for another 8 days, and again 5 days with liver extract, still without amelioration. On April 29th nicotinic acid was started by mouth 3 cachets daily each of 5 cgm. Improvement was obvious in 3 or 4 days, the stools were less bulky and changed in character, the patient increased in weight 2·6 kgm. in 10 days; on the 16th the dose was raised to 20 cgm. and on the 18th to 25 cgm., the last was never surpassed. The improvement has been maintained to the time of reporting [but the interval has not yet reached the length of that of improvement after taking liver in 1937. A further report will be awaited with interest]. *H. H. S.*

JUSTIN-BESANÇON (L.), CAROLI (J.) & INBONA (J. M.). Le traitement nicotinique de la stéatorrhée idiopathique. Remarques biologiques et nosologiques. [**Nicotinic Acid in Idiopathic Steatorrhoea.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1939. July 17. 55th Year. 3rd Ser. No. 24. pp. 1141–1145.

The authors, after recalling two Danish cases treated with success by nicotinic acid, mention another under their own observation. Details are not given but the resemblances between sprue and pellagra are pointed out—stomatitis, glossitis, pigmentation, diarrhoea, anaemia. They are of opinion that the nicotinic acid has not merely an effect on the water content of the stools but that it has an action, direct or indirect, on the metabolism of fats. *H. H. S.*

BING (Jens) & BROAGER (Bendt). **Investigations on the Effects of Nicotinic Acid on Two Patients with Idiopathic Steatorrhoea (Sprue).**—*Acta Med. Scandinavica.* 1938. Vol. 97. No. 5–6. pp. 561–577. With 3 figs. [54 refs.]

The success following the use of nicotinic acid in pellagra was certain to lead to trial of the same drug in other diseases of obscure aetiology and notably sprue. In this article the authors record their observations on its use in two cases of ideopathic steatorrhoea. Neither patient had been away from Denmark. In the case of the second patient, a woman of 28 years, the condition was so bad that little benefit could be expected from any form of treatment. The first was a woman of 49 years who had been ill for about a year with lassitude, thin, pale, watery stools, abdominal distension, and loss of weight, 10 kilos in the year. On her admission she was passing copious pasty stools, two daily; there was no stomatitis; serum calcium 9·1 mgm. per cent., phosphorus 4·0 mgm.; there was achylia. Nicotinic acid was given intravenously in doses of 30 mgm. twice daily, later 40 mgm. for nine days, then orally in doses of 100 mgm. five times a day, as for pellagra. She was taking ordinary full diet. Within 48 hours of beginning the treatment the stools became firmer, returning to the loose, pultaceous form when the nicotinic acid was withheld for a week. This was practically the only symptom to be modified; there was no effect on the hypotension, the pigmentation, the flat blood sugar tolerance curve, or the achylia. In the second patient also there was observed a reduction in the quantity and water content of the stools. In neither patient was there any increase in absorption of dry substance, lipoid, nitrogen, calcium or ascorbic acid, and none of the symptoms was changed except the diarrhoea.

H. H. S.

FUCHS (Heinrich) & WISSELINCK (Arnold). Versuch der Behandlung eines Falles von Sprue mit Nicotinsäure. [**Trial of Nicotinic Acid in Sprue.**]—*Klin. Woch.* 1939. May 20. Vol. 18. No. 20. pp. 722–723.

"Non-tropical sprue appears to be allied to pellagra." Such a statement was almost bound to appear when the error crept in of diagnosing as sprue any condition in temperate climates in which one or more of the symptoms of tropical sprue were present.

The case described in this paper is that of a man of 31 years who gives no history of ever having lived abroad, who suffered from vague

abdominal symptoms which had led to such diagnoses as duodenal ulcer, gastro-colic fistula, duodenitis, relaxed (offener) pylorus and others, and from stomatitis and oedema of legs, brittle finger-nails, a considerable degree of anaemia and osteoporosis. For these reasons a diagnosis of " true sprue " was made. Treatment by liver preparation, vitamin B_1, vitamin C and vigantol was ineffectual, so nicotinic acid was tried, also without benefit until increased dosage to 100 mgm. daily was employed.

Beyond the facts that erythrocytes numbered 2·5 million, leucocytes 5,800 per cmm., and haemoglobin 60 per cent. details of blood examination are not given. The size of red cells, presence or absence of erythroblasts, relative leucocyte counts, calcium content of serum or plasma, none of these is mentioned ; nor is there any analysis of the stools given—in short nothing to confirm the diagnosis of sprue. On the other hand, the brittle and atrophied nails, the character of the tongue, painful extremities with tingling in hands and feet, and the presence of osteoporosis are all indicative of a pellagroid condition. That is, briefly, we have here another record of pellagra reacting well to nicotinic acid and not (so far as the report given goes) a case of sprue at all. *H. H. S.*

BRULL (Lucien), with the collaboration of A. LAMBRECHTS & G. BARAC. Sprue non tropicale. Etude approfondie de quatre cas observés en Belgique. [**An Intensive Study of Four Cases of Non-Tropical Sprue.**]—*Rev. Belge Sci. Méd.* 1938. Oct. Vol. 10. No. 8. pp. 457–531. With 1 fig. [27 refs.]

[There is at present no satisfactory term for the condition here described. " Sprue " should be reserved for the tropical or subtropical disease and should not be applied vaguely to any cases with bulky and fatty stools, any more than ulcerative lesions of rhinopharynx should be called non-tropical gangosa or yaws. Again, " idiopathic steatorrhoea " is not good either, for " idiopathic " merely means that we have not yet discovered the cause.]

The four cases here detailed were certainly " intensively studied " ; for the first, in addition to full description in the text there are twenty-two pages of tabulated analyses of the ingesta and excreta. All four passed fatty stools, three had a low blood calcium, two a stomatitis. None had been in the tropics. The first was a woman of 56 years whose disease had persisted on and off for more than 20 years ; at times the stools numbered 14 a day and she had lost 53 kilos in weight, but the anaemia was not great. The second, a woman of 53 years, had suffered with diarrhoea from childhood and for 12–18 months from stomatitis. The third, a woman of 20 years with a history of fatty diarrhoea dating back two years, showed marked tetany and low blood calcium (3·8 mgm. per cent.). Her sister had suffered similarly as a child for 6 years. The fourth, also a woman, 34 years of age, had had attacks of diarrhoea alternating with constipation for ten years or longer and at one time suffered from aphthous stomatitis ; she had lost 14 kilos in a year. She had no tetany and the plasma calcium was high, 12·4 mgm. per cent.

The causation is discussed and the author concludes that the condition is due to multiple avitaminoses, A, B, C and D, all being deficient, associated with a reduction of the digestive secretions.

H. H. S.

HOLMES (J. MacDonald). **Osteomalacia of the Spine associated with Chronic Diarrhoea.**—*Lancet.* 1939. Feb. 4. pp. 264–266. With 2 figs. on 1 plate.

An interesting case is described in which the history in some respects suggests a diagnosis of sprue contracted in Burma; in fact this was the primary diagnosis. The non-committal title of the paper, however, is more accurate. The question of sprue is discussed, but there are more points against this than in its favour. In spite of the symptom of diarrhoea having continued, on and off, for 18 years there is no anaemia, the stools do not indicate steatorrhoea, in spite also of the presence of tetany the blood calcium is practically normal; again osteoporosis does not occur in tropical sprue. *H. H. S.*

FROSTAD (Simon). **A Case of Non-tropic Sprue with Normo- and Megaloblasts in the Peripheral Blood.**—*Acta Med. Scandinavica.* 1939. Vol. 99. No. 2–3. pp. 257–261. With 2 figs.

The author gives an account of a man of 40 years who has suffered for 4 years with steatorrhoea "which has defied every therapy attempted." The symptoms present were diarrhoea, the stools, 10–20 in the day, being often thin and watery, anaemia macrocytic in type but with many erythroblasts, blood calcium 8·5 mgm. per cent., no indications of osteoporosis. The tongue papillae were atrophied but there had been no complaint of soreness and no stomatitis. No mention is made of the patient ever having left Scandinavia. [The fact that his condition had "defied all treatment" for so long, and the presence of many nucleated red corpuscles are among the points of differentiation from tropical sprue.] *H. H. S.*

BURGDORF (A. L.) & BARRY (Thomas A.). **Nontropical Sprue.**—*Jl. Amer. Med. Assoc.* 1939. June 17. Vol. 112. No. 24. pp. 2508–2509.

The case here recorded bears closer affinities to sprue than many which have been reported of late years under the denomination of "non-tropical sprue." The patient, a man of 42 years, living in Seattle, had never been in the tropics. He had suffered "for years" from pain, nausea and even vomiting after food and at the age of 36 a gastro-enterostomy had been performed to deal with "an ulcer of the distal end of the stomach and one in the colon." His stools were watery, without blood or mucus, and 5–8 daily. He had lost much weight, had a protruding abdomen and occasional oedema; serum calcium was low, 5 mgm. per cent., but rose to 10 mgm. on treatment. The blood showed reduction of erythrocytes to a little over two million, of the macrocytic type, no erythroblasts; leucocytes in the earlier days 6·5 thousand, towards the end between six and seven times as many per cmm., colour index usually above unity. In the course of 5 years he was admitted to hospital four times; improvement followed treatment to such a degree that he was able to resume work. He died in hospital four days after his fourth admission.

[The chief points of difference from true sprue were the presence of osteoporosis which was marked in the vertebral column, and had been recognized by radiography during life, and the stools are described as "watery," not the copious fatty, pale stools of sprue. No mention is made in the record of important points which, doubtless, must have

been studied, such as the basal metabolism, the results of faecal analyses, and the character of the blood sugar curve, so we cannot say whether these agreed with the findings of true sprue.] *H. H. S.*

LEPROSY.

Précis of Abstracts in this Section.

The lepra reaction, according to Stein (p. 38) is a hyperergic inflammation differing only in degree from non-reacting leprous tissue.

Ross (p. 38) found decrease in the oxidized blood glutathione in 23 cases of leprosy.

Radna (p. 38) shows that blood lipase is low in leprosy especially during reactions, thus confirming earlier work. He also (p. 38) found that blood calcium is reduced.

Tanguy (p. 39) found abnormal colloidal benzoin reactions in the c.s.f. in leprosy.

Sáenz and Palomino (p. 39) state that tuberculoid leprosy can only be recognized with certainty by microscopical examination, but anaesthesia is constant in parts of the skin lesions. Lowe (p. 39) found tuberculoid changes in 11 of 13 palpable lymph glands excised in leprosy. Schujman (p. 39) regards tuberculoid leprosy as a special allergic form of the disease. He knows of no instance in which it has evolved into the lepromatous type. The Mitsuda reaction is positive.

Camargo and Bechelli (p. 39) give figures of the distribution of the 4 categories of lesions they describe :—nervous, cutaneous, nasal and trophic.

de Barros (p. 40) thinks that without the use of the slit lamp many early eye lesions in leprosy may pass unrecognized. Infiltration or nodule formation may occur in the cornea, with keratitis and episcleritis. In the iris he (p. 40) shows that there may be diffuse inflammation or miliary nodules. de Souza (p. 41) describes a leper who showed signs of poikilodermia and erythromelalgia. Bechelli (p. 41) describes a patient with extensive polyneuritis regarded as leprotic in origin.

Muir (p. 41) discusses the mental depression occasioned by the attitude of abhorrence adopted by the community towards lepers on account of the disfigurement caused by the disease.

Núñez Andrade (p. 42) comment on the causes of death in leprosy : in Mexico enterocolitis is the chief, but at Culion pulmonary tuberculosis is the most frequent.

Campos and Alayon (p. 42) discuss the differential diagnosis of certain syphilitic and leprotic lesions.

Black and Ross (p. 42) obtained only 37·5 per cent. of positive reactions with the complement fixation test using the bacillus of Lleras Acosta in 24 bacteriologically negative lepers [presumably 9 cases positive], and 10·3 per cent. positive in non-tuberculous controls. They therefore conclude that the test is of no practical value. The

Vernes test was not found to be of value in leprosy by MONTEL *et al.* (p. 43).

ROTBERG (p. 43) shows that in nodular leprosy the lepromin test is negative, but in the tuberculoid form the true positive reaction occurs. He gives the characters by which the reaction should be judged. JUSCHKO (p. 44) uses the weal test with normal saline to discover the rate of water absorption, which is rapid in leprosy. The test is not specific but gives an idea of the general condition.

In treatment DELANOE (p. 44) advocates the changing of drugs every two days, and gives a list of those used. PAGET *et al.* (p. 45) discuss the factors producing irritation on injection of various preparations of hydnocarpus oil. RADNA (p. 45) uses local injection of chaulmoogra preparations, with Bier's hyperaemia, in the treatment of trophic lesions. GRIMES (p. 46) records excellent results in treatment by oral administration of extracts of *Hydrocotyle asiatica.* ETCHEVERRY (p. 46) uses a 2-3 per cent. solution of bile constituents in saline or glucose solution for injection into lepromata. Reactions are caused but reinjection can be carried out when these subside. Weaker solutions may be used for eye lesions.

BOENJAMIN (p. 46) reports on treatment with Reenstierna's serum in 7 patients. No definite conclusions can be drawn but improvement occurred in some. BLUETH (p. 47) reports success with Betaxin, a preparation of vitamin B_1, in the treatment of vasodilatation of nerve origin. RADNA (p. 47) finds that blood transfusions are beneficial in the treatment of lepra reactions. OBERDÖRFFER and COLLIER (p. 47) advise daily exercises to overcome deformities of hands and feet caused by muscular paresis secondary to nerve lesions.

MANALANG (p. 48) considers that leprosy is acquired chiefly if not entirely in infancy and early childhood through contact and that adults may be considered immune. He therefore proposes to release all adult lepers who wish to remain at home and utilize the money saved to protect the children of lepers by isolation. The Manila Council of Hygiene consider these views to be extreme and the proposals impracticable and prefer the proposals of the Cairo Congress.

MONACELLI (p. 48) describes anti-leprosy measures in Sicily. DAVEY (p. 48) describes how, in connexion with the Uzuakoli leper colony in Nigeria, small isolation hamlets have been founded in the neighbouring villages, where in return for assistance the lepers are segregated and regularly visited for treatment and for examination of contacts. This measure brings a large area under the supervision of experts.

Rat leprosy.—Haematopinus spinulosus and *Laelaps echidninus* were found incapable of transmission of rat leprosy by MARCHOUX and CHORINE (p. 49). The same authors (p. 49) found that penetration of the skin by rat leprosy bacilli may occur through the minute wound caused when hair bulbs are pulled out.

Exposure to ultra-violet rays for 10 minutes destroys the virulence of rat leprosy bacilli, according to PRUDHOMME (p. 50). COWDRY *et al.* (p. 50) report on the chemical alterations in rat leprous tissues and rat leprosy bacilli.

In rat leprosy BERNY and CHABAUD (p. 50) obtained some beneficial effects with certain selenium compounds. Borneol had some effect in retarding progress. CHORINE (p. 50) used toxic doses of uranium oxide which produced rapid softening of the lesions. *C. W.*

STEIN (A. A.). Zur Morphologie der Leprareaktion. I. Mitteilung. Histologische veränderungen bei der I. Typus von leprareaktionen. [**Morphology of Lepra Reaction. Histological Changes.**] —*Internat. Jl. Leprosy.* Manila. 1939. Apr.–June. Vol. 7. No. 2. pp. 149–160. With 12 figs. on 3 plates.

This is a report on microscopical examinations of reacting leprous tissues. The conclusion is reached that the changes are characteristic of " hyperergic " inflammation with perivascular infiltration of the cellular elements and lipoid-containing Virchow's cells. It only differs in degree from the changes found in non-reacting leprous tissues.

L. Rogers.

ROSS (Hilary). **Blood Glutathione in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1939. Jan.–Mar. Vol. 7. No. 1. pp. 51–55.

Glutathione is a sulphur compound concerned in oxidation-reduction processes in cells. No alteration in the reduced glutathione was found in leprosy, but there was a definite decrease in the oxidized substance in 23 cases. *L. R.*

RADNA (R.). Sur la lipase du sérum des lépreux. [**Lipase in the Serum of Lepers.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Mar. 31. Vol. 19. No. 1. pp. 55–59.

The authors record determinations of the serum lipase in 59 leprosy cases and in 69 non-leprous persons, including 39 with intestinal worms, who gave normal readings. The leprosy cases showed mean readings below the normal and the lowest ones in bad cases with numerous lepra bacilli. The readings fall considerably during reactions. [This confirms earlier workers, including ROGERS.] *L. R.*

RADNA (R.). Sur la teneur en calcium du sérum des indigènes du Congo Belge. [**Calcium in the Serum of Lepers.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Mar. 31. Vol. 19. No. 1. pp. 61–63.

Observations made in the Belgian Congo are reported to show that the sera of healthy natives gave normal calcium contents, but in cachexial states, including bad leprosy cases, the calcium is reduced in the blood. *L. R.*

TANGUY (Y.). La réaction au benjoin colloidal dans le liquide céphalo-rachidien des lépreux. [**The Colloidal Benzoin Reaction in the Spinal Fluid of Lepers.**]—*Bull. Soc. Path. Exot.* 1939. Mar. 8. Vol. 32. No. 3. pp. 278–280.

The author records that while examining the cerebrospinal fluid of eight lepers he noted an anomalous reaction with colloidal benzoin in the form of an increase in the size of the zone of precipitation. [See this *Bulletin*, 1939, Vol. 36, p. 253 for details of this reaction.] *L. R.*

FABIANI (G.). Sur un cas de lèpre indigène en Algérie. [**A Case of Indigenous Leprosy in Algeria.**]—*Bull. Soc. Path. Exot.* 1939. Mar. 8. Vol. 32. No. 3. pp. 276–278.

SÁENZ (Braulio) & PALOMINO (J. Castro). **Tuberculoid Leprosy.**—*Arch. Dermat. & Syph.* 1939. Mar. Vol. 39. No. 3. pp. 456–470. With 5 figs. [24 refs.]

This is an illustrated account of seven cases of tuberculoid leprosy. The condition can only certainly be recognised by microscopical examination. It is mild, with a tendency to recover, and does not show lepra reactions, so it is important that it should be diagnosed. Anaesthesia is a constant symptom in parts of the skin lesions and the bacilli may be absent or very scarce. *L. R.*

LOWE (John). **Tuberculoid Changes in Lymph Nodes in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1939. Jan.–Mar. Vol. 7. No. 1. pp. 73–74.

Palpable lymph glands have been excised in thirteen cases of leprosy and eleven of them were found to show tuberculoid changes. This finding is considered to be of interest, though perhaps not of great practical importance. *L. R.*

SCHUJMAN (Salomon). Evolución y pronostico de la lepra tuberculoide. (Estudio realizado en 100 casos vigilados de 2 a 10 años.) [**Tuberculoid Leprosy. Evolution and Prognosis.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Mar. Vol. 7. No. 1. pp. 1–25. With 14 figs. on 7 plates. English summary.

The author states that he does not know of a recorded case of the evolution of tuberculoid leprosy into the lepromatous form, nor has he met with any in 100 cases, although a lepra reaction has been mistaken for it. Mitsuda's skin test is positive in tuberculoid and negative in lepromatous cases. The author's tuberculoid cases showed improvement and cure in 30 and persistence with little change for many years in the others. He regards it as a special allergic form of the disease. *L. R.*

TAPPEINER (Sepp). Ueber Lepra mixta. [**Mixed Leprosy.**]—*Arch. f. Dermat. u. Syph.* 1939. Mar. 18. Vol. 178. No. 5. pp. 570–581. With 7 figs.

GIL YEPEZ (Carlos). La lepra tuberculoide. [**Tuberculoid Leprosy.**]—*Bol. Ministerio de Sanidad y Asistencia Social.* Caracas. 1939. Mar. Vol. 4. No. 2. pp. 64–70. With 4 plates.

LIMA (Lauro de Souza). Classificação das leprides. [**Classification of Leprides.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 63–69. With 2 figs.

CAMARGO (Arthur T.) & BECHELLI (Luiz M.). Natureza e séde das lesões iniciais da lepra. [**Nature and Site of the Initial Lesions in Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 35–48. [22 refs.] English summary.

The authors have made a careful study of 1,087 lepers in Asílo-Colonia Cocais and divide them into four categories : (1) Those with disturbances of nervous origin ; (2) Those with cutaneous lesions ;

(3) Those with nasal lesions ; (4) Those with trophic lesions. To the first of these were relegated 638 cases (58·6 per cent.), and these could be subdivided into those with anaesthesia somewhere in the extremities, 427 cases (39·2 per cent.) ; 148 (13·2) with sensations of heat and cold, formication, usually in arms and legs, and localized neuralgias in 63 (5·8 per cent.). In the second were 298 (27·4 per cent.) ; in 135 (12·4) erythematous patches were the first observed sign, in 111 (10·2 per cent.) there was achromia, and in 7 (0·6 per cent.), pigmentation. In forty-five, lepromata were the first sign. Nasal lesions, group 3, accounted for 65 (5·9) and trophic lesions for 64 only (5·8 per cent.). In the remaining 22 (2 per cent.) the leprotic reaction was the first symptom noticed. *H. H. S.*

DE BARROS (J. Mendonça). Paralelismo entre lesões oculares e cutaneas na lepra. [**Parallelism between Ocular and Cutaneous Lesions in Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 19–22. With 4 figs. on 2 plates. English summary.

The percentage of cases of tubercular leprosy in which ocular symptoms are found varies greatly according to different observers. The author, who is ophthalmologist to the Padre Bento sanatorium, is of opinion that this diversity arises from two reasons. First, in different regions the proportion of eye cases does vary considerably ; but, secondly, special examination may be needed for discovery of eye lesions, and that unless the slit lamp is used many cases in the early stage pass undiagnosed. At certain stages the corneal lesions morphologically resemble those of the skin, in some infiltration only, in others nodule formation, in others again the two combined. *H. H. S.*

DE BARROS (J. Mendonça). Mais alguns aspectos do comprometimento ocular na lepra. [**Further Cases of Eye Involvement in Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 13–17. With 12 text figs. & 4 coloured figs. on 2 plates.

This article contains little letterpress but presents 24 photographs and four coloured illustrations of eye affections of leprosy seen at the Padre Bento sanatorium. These depict sclero-corneal lepromata, keratitis, corneal infiltration, diffuse episcleritis and corneal lepromata. *H. H. S.*

DE BARROS (J. Mendonça). Aspectos clinicos do comprometimento da iris na lepra. [**Clinical Aspects of Involvement of the Iris in Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 3–12. With 11 coloured figs. on 5 plates. English summary.

This is an account of observations carried out on 137 patients by the ophthalmologist of the Padre Bento sanatorium. He divides cases into two main groups : (1) Those with diffuse inflammation, which may be acute, subacute, or chronic, and (2) Those with miliary nodules.

In the acute diffuse form the onset is sudden with severe pain, photophobia and lachrymation ; rarely are both eyes attacked

simultaneously. The aqueous contains threads and coagula and there is a tendency to formation of synechiae which is difficult to overcome. In the less acute and chronic forms the inflammatory symptoms are slighter and the tendency to synechiae less; pain is much less and, in fact, may not be complained of; exudate accumulates in the angle behind the limbus and may organize to distort the shape of the pupil. In the miliary form, pearly granulations are seen by the help of the slit lamp and they may remain indefinitely without showing any definite signs of inflammation. The conditions are depicted in a series of very fine coloured plates. *H. H. S.*

DE SOUZA (Argemiro Rodrigues). Lepra—poikilodermia de Petgés-Jacobi com concreções calcareas subcutaneas—sindromo de Weir-Mitchell. [**A Case of Leprosy presenting Petgés-Jacobi's Poikilodermia and Weir-Mitchell's Syndrome.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 161–171. With 3 figs. on 2 plates. German summary.

The patient was a man of 59 years suffering from the maculo-anaesthetic type of leprosy, the first signs of which made their appearance in 1924, that is at the age of 44 years, but the condition was not diagnosed as leprosy till 1932 when he presented himself for treatment on account of lancinating pains in the feet. The same year closer examination revealed the signs of Weir-Mitchell's syndrome. [This, also known as erythromelalgia, is a disease affecting the feet or, less often, the hands, and characterized by pain, redness, throbbing and swelling, attributed to disease of the cord, to neuritis or to vaso-motor neurosis (the reverse of Raynaud's disease of vascular spasm)]. There was also a poikilodermia with subcutaneous calcareous deposits at the base of the neck and upper thorax and right humerus and as a chain at the tibio-tarsal articulations and along the metatarsals. The author regards the sequence of events to have been: leprosy, poikilodermia with subcutaneous concretions (Petgés-Jacobi), and lastly erythromelalgia (Weir-Mitchell's syndrome). *H. H. S.*

BECHELLI (Luiz Marino). Considerações sôbre um caso de polinevrite leprosa. [**A Case of Leprotic Polyneuritis.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 179–189. With 2 figs. on 1 plate. [13 refs.] English summary.

A man of 30 years who had shown signs of leprosy for 8 years, beginning as a neuritis. The condition of his nervous system is described in detail, with the motor and sensory changes. The following were involved: sciatics, popliteals, branches of the brachial plexus and the auricular nerve (cervical plexus). The pain at the onset was intense, and trophic disturbances were observed, muscular atrophy, deformities, oedema, acrocyanosis, absence of reflexes. The diagnosis is discussed and the conclusion reached that all was leprotic in origin. There were no psychic disturbances. *H. H. S.*

MUIR (E.). **Some Mental Aspects of Leprosy.**—*Leprosy Review.* 1939. Apr. Vol. 10. No. 2. pp. 114–118.

This is a brief discussion of the abhorrence shown by the community towards lepers, which is responsible for the depressed mental condition of the patients. This is due to the disfigurements caused by the

disease, as leprosy is not nearly as infectious as tuberculosis. Suitable employment helps to restore self-respect. In the Louisiana leprosarium the author found 18 per cent. of the patients suffering from mental depression and 3 per cent. from definite psychoses. Sympathetic treatment is of the greatest importance. *L. R.*

NÚÑEZ ANDRADE (Roberto). Causas más frecuentes de mortalidad en la lepra. [**The Commonest Causes of Death in Leprosy.**]—*Medicina.* Mexico. 1939. June 10. Vol. 19. No. 341. pp. 173–176.

The figures of deaths of lepers in Mexico are given and also those for the Culion colony; the former deals with 1,074, the latter are PINEDA's returns based on 300 deaths, but the contrasts are so marked that they are worth noting. Of the 1,074 there were 384 uncertified medically as to the actual cause (35·7 per cent.). The differences are best seen from the following table of percentages compiled from figures in the text :—

	Mexico	Culion
Pulmonary tuberculosis	1·6	24·0
Nephritis	2·3	16·3
Bronchopneumonia	3·1	9·3
Dysentery	0·6 (amoebic)	3·8 (not specified)
Enterocolitis	15·5	1·3
Leprotic cachexia	9·9	2·3

H. H. S.

CAMPOS (Nelson Sousa) & ALAYON (Fernando). Lepra e sifilis. [**Leprosy and Syphilis.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 101–111. With 6 figs. & 3 plates. English summary (7 lines).

The authors discuss the similarity between certain syphilides and leprotic lesions, particularly tuberculo-circinate lesions of the skin. They give in detail six cases in which the diagnosis on purely clinical grounds was in doubt, but was determined by serological reactions being positive for syphilis while examination of local lesions and of nasal mucosa was negative for Hansen's bacillus. *H. H. S.*

OBERDÖRFFER (Manfred J.) & COLLIER (D.). Lupus vulgaris bei Knotenlepra. [**Lupus Vulgaris in Nodular Leprosy.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Apr. Vol. 43. No. 4. pp. 170–172. With 3 figs.

BLACK (Sam H.) & ROSS (Hilary). **The Complement Fixation Reaction of Lleras in Leprosy.**—*Public Health Rep.* 1939. Mar. 10. Vol. 54. No. 10. pp. 392–399.

The authors report a comprehensive test of the claims of the Lleras Acosta reaction by complement fixation with an antigen prepared from an acid-fast bacillus cultivated from a case of leprosy. Lleras Acosta claimed positive reactions in 99·38 per cent. in bacteriologically positive cases and 92·5 in negative neural cases, in which alone the test

would be of real value. In diseases other than leprosy, 1·52 per cent. were positive. The present authors have tested 164 positive and 24 negative leprosy cases and 379 other cases, including 50 of tuberculosis. They obtained only 37·5 per cent. of positive reactions in neural leprosy and 10·3 in non-tuberculous controls. They therefore conclude that the test is of no practical value. [See this *Bulletin*, 1938, Vol. 35, pp. 551, 887.] *L. R.*

LOWE (John) & GREVAL (S. D. S.). **Complement-Fixation in Leprosy and Other Diseases by the Witebsky, Klingenstein and Kuhn (W.K.K.) Antigen.**—*Indian Jl. Med. Res.* 1939. Jan. Vol. 26. No. 3. pp. 833–841. [16 refs.]

MONTEL (L. R.), LE-VAN-PHUNG, DO-VAN-HOANH & TRAN-VAN-HANH. 526 cas de lèpre. Formules cytologiques. Réactions de floculation de Verne. Analyses du sang. Diagnostic bactériologique. [**Laboratory Investigations in Leprosy**].—*Rev. Méd. Française d'Extrême-Orient.* 1939. May. No. 5. pp. 623–627.

The authors record the results of laboratory investigations in Indo-China. Cytological observations showed an increase in the eosinophils, but it was not of diagnostic importance. Their bacteriological diagnostic examinations were in accordance with general experience. Vernes's flocculation reaction was not more frequently positive in lepers than in healthy people, so is of no diagnostic import. *L. R.*

RUGE & MAASS (E.). Zur Frage der Rubino-Reaktion. [**Rubino Reaction.**] —Reprinted from *Festschrift Bernard Nocht z. 80. Geburtstag von seinen Freunden u. Schülern.* Hamburg. 1937. pp. 535–537.

DEGOTTE (J.). Diagnostic précoce de la lèpre. Valeur comparée des diverses recherches bactériologiques et cliniques. [**Early Diagnosis in Leprosy: Comparison of Bacteriological and Clinical Methods.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Dec. 31. Vol. 18. No. 4. pp. 533–537.

DUBOIS (A.) & RADNA (R.). Incisions multiples de la peau dans le diagnostic bactérioscopique de la lèpre. Signification des bacilles acido-résistants rencontrés. [**Significance of Acid-Fast Bacilli in the Skin in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Dec. 31. Vol. 18. No. 4. pp. 547–552.

ROTBERG (A.). **The Reading of the Lepromin Test.**—*Internat. Jl. Leprosy.* Manila. 1939. Apr.–June. Vol. 7. No. 2. pp. 161–166.

This paper is best summarized in the author's own conclusions:—

"The present system of reading the lepromin test was established arbitrarily, and the findings have been related to the different forms of leprosy, the immunological characteristics of which are still uncertain. From this combination of unknown factors much confusion may arise. For example, of 194 nodular cases 74 gave "positive" reactions that could evidently have no immunological or prognostic significance.

"Studying the evolution of the reaction in two very distinct groups of cases, nodular and tuberculoid, with undoubtedly opposite conditions of

immunity, the author points out the essential distinctive features of the reactions typical of these forms of the disease.

" In the nodular form the test is negative : there is no reaction, or only a small papular one, due to nonspecific factors, which reaches its maximum before the fourth or fifth day, seldom is larger than 5 mm., and may persist until the fourth week.

" In the tuberculoid form the true positive reaction occurs : a nodular lesion, often suppurating, usually belated in appearing, of progressive evolution, generally reaching its maximum from the second to the sixth week, seldom less than 5 mm. in diameter in the fourth week.

" The dimensional criterion of positivity is not sufficient, and the test must be performed by trained observers familiar with the clinical signs. Even so, it is necessary to admit a large group of doubtful reactions, of indefinite aspect and borderline dimensions (4–6 mm. diameter). Recognition of doubtful groups permits not only avoiding error of reporting reactions, but also avoids possible faults due to different antigenic values of different lots of lepromin, the standardization of which still presents a problem." *L. R.*

JUSCHKO (S. S.). Hydrophylie des gewebes bei Lepra. [**Absorption of Water by the Tissues in Leprosy.**]—*Internat. Jl. Leprosy.* Manila. 1939. Jan.–Mar. Vol. 7. No. 1. pp. 41–50.

The author discusses the causation of the water exchange in the tissues in leprosy with the help of the " weal test " of McClure and Aldrich. An injection of 0·2 cc. of normal saline is made intracutaneously on the inner surface of the forearm and the time required for the disappearance of the weal noted. The normal time in controls was 58 minutes, and in 13 cases of leprosy it varied from 17 to 48 minutes. Disturbance in the water exchange occurred in 95 per cent. of cases, with acceleration parallel with the extent of the leprous processes. The test, like the erythrocyte sedimentation rate, helps to determine the general condition of the patient. *L. R.*

DELANOE (E.). Réflexions au sujet de la lèpre [**Reflections on Leprosy.**]—*Bull. Soc. Path. Exot.* 1939. Mar. 8. Vol. 32. No. 3. pp. 323–328.

This paper advocates treating cases of leprosy in hospital with changes in the drug used every two days so as to prevent the bacilli becoming accustomed to any one preparation. Among those advocated are arsenobenzol, chaulmoogra oil, Solganum B, irradiated tri-calcine, gynocardate of soda, salts of calcium, and phosphates, hyrganol, vaccine BCG, oil of camphor, quinine, methylene blue, koumyl, etc. The author claims very much better results by this plan of polypharmacy. *L. R.*

THAMBIAH (S.). **Problems connected with the Diagnosis and Treatment of Leprosy.**—*Jl. Indian Med. Assoc.* 1939. June. Vol. 8. No. 9. pp. 516–518.

CAMBESSÉDÈS (H.). Rappel des notions essentielles sur l'état actuel du traitement de la lèpre. [**Treatment of Leprosy.**]—*Rev. Méd. et Hyg. Trop.* 1938. Nov.–Dec. Vol. 30. No. 6. pp. 320–325.

PAGET (H.), TREVAN (J. W.) & ATTWOOD (A. M. P.). **The Irritant Action of Some Drugs derived from Hydnocarpus Oil.**—*Internat. Jl. Leprosy.* Manila. 1939. Apr.–June. Vol. 7. No. 2. pp. 167–173.

This paper reviews ten years' work in the Wellcome Physiological Research Laboratories. It is best summarized in the authors' own words :—

"1. An acid value of 3 is sufficient to render hydnocarpus preparations irritant.

"2. Hemolysis is caused rapidly by salts of hydnocarpus acids in normal saline but it is so far inhibited by the presence of serum that it cannot be considered an important factor in causing pain on injection.

"3. The amount of formic acid present in ethyl esters which have deteriorated is insufficient to account for more than a small part of the irritation.

"4. Aralkyl esters (thymyl-, phenylethyl-, cinnamyl-, and menthyl-) of the crystalline acids are less irritant than the ethyl esters, causing no necrosis on intradermal injection.

"5. Iodized ethyl esters of the crystalline acids are unstable on exposure to air, but oxidation is inhibited by addition of 0·1 per cent. of catechol or pyrogallol."

L. R.

POSSOLO (Helena). A quimica do oleo de chaulmoogra. [**The Chemistry of Chaulmoogra Oil.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. June. Vol. 7. No. 2. pp. 171–186. With 10 figs. on 6 plates. [33 refs.]

BASU (U. P.) & MAZUMDER (A.). **On the Keeping Properties of** *Hydnocarpus wightiana* **Oil and its Derivatives.**—*Leprosy in India.* 1939. Apr. Vol. 11. No. 2. pp. 53–61. With 3 figs.

LEPROSY REVIEW. 1939. July. Vol. 10. No. 3. pp. 186–188.—**How to use Creosoted** *Hydnocarpus wightiana* **(Chaulmoogra) Oil Mixture.**

BURSCHKIES (Karl). Ueber die Bedeutung der Chaulmoograsäure und deren Derivate für die Chemotherapie der Lepra und der Tuberkulose. [**Significance of Chaulmoogra in the Chemotherapy of Leprosy and Tuberculosis.**]—*Zent. f. Bakt.* I. Abt. Orig. 1939. Aug. 15. Vol. 144. No. 1/5. Beiheft pp. 239*–243.* [13 refs.]

This is a highly technical chemical paper, on certain new compounds, which should be consulted in the original by those interested. *L. R.*

RADNA (R.). Sur le traitement des lésions trophiques lépreuses. [**Treatment of Trophic Lesions.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Mar. 31. Vol. 19. No. 1. pp. 65–71.

The author confirms the value of the treatment of LOWE and CHATTERJI by the local injection of chaulmoogra oil or its esters. Combining it with Bier's stasis materially improves the results. [See this *Bulletin*, 1938, Vol. 35, p. 297.] *L. R.*

MAYNARD (N. H.). **Treatment of Trophic Ulcers.**—*Leprosy Review.* 1939. Apr. Vol. 10. No. 2. pp. 118–120. With 2 figs.

GRIMES (M.). Le traitement de la lèpre par l'hydrocotyle. (Note préliminaire.) [**Treatment with Hydrocotyle.**]—*Bull. Soc. Path. Exot.* 1939. June 14. Vol. 32. No. 6. pp. 692–693.

The author reports on a year's trial of fluid and alcoholic extracts of the dried plant, *Hydrocotyle asiatica* orally. He claims the most remarkably beneficial results, including the rapid resolution of eye lesions. It is most effective in lepromatous cases, but neural ones recover more slowly, although perforating ulcers heal quickly. The treatment is thus considered to hold out great hopes. *L. R.*

DE ALMEIDA (A. Ozorio) & COSTA (Henrique Moura). **Treatment of Leprosy by Oxygen under High Pressure associated with Methylene Blue.**—*Rev. Brasileira Leprologia.* S. Paulo. 1938. Vol. 6. Special No. pp. 237–265. With 52 figs. on 30 plates. [82 refs.]

ETCHEVERRY (Virgilio P.). Las sales biliares en el tratamiento de la lepra. [**Bile Salts in the Treatment of Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. June. Vol. 7. No. 2. pp. 157–164. English summary (6 lines).

The author was first led to consider the use of bile salts in the treatment of leprosy by observing a patient suffering from macular leprosy whose lesions appeared to undergo a favourable change while he was affected with chronic jaundice. In 1930 he began to inject solutions of ox-bile into lepromata and noticed that some became smaller and even disappeared, and he passed from this to the use of bile salts for lepromata and for the ocular lesions of leprosy.

For the former he used *Fel tauri depuratum siccum* or cholate of sodium which is prepared from ox-bile by removing mucin and pigments and then drying and powdering the product. It consists mainly of sodium taurocholate and glycocholate, together with free bile acids, fatty acids, cholesterin and phosphatides. Its composition varies. For injection the vehicle employed is physiological saline or isotonic glucose. A 1 per cent. solution gives slight reaction and needs frequent repetition ; 2–3 per cent. causes a stronger reaction and may give rise to some necrosis ; 4·5 per cent. or stronger causes violent inflammation and considerable destruction of tissue. Two to three per cent. is the strength preferred and the reaction has usually subsided so that a second injection can be given in 8–10 days.

For eye lesions the weaker solutions are used, 0·5, 0·75 or 1 per cent., either in the form of an ointment, or as a prolonged bath (20 minutes or so at a time, and twice or thrice daily if tolerated), or the preparation, after purification by means of animal charcoal, is dissolved in isotonic glucose and injected subconjunctivally. *H. H. S.*

BOENJAMIN (R.). Toepassing van Reenstierna's antilepraserum bij enkele leprozen te Batavia. [**Treatment by Reenstierna's Anti-leprosy Serum in Batavia.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. May 30. Vol. 79. No. 22. pp. 1346–1370. English summary.

" The treatment consisted of one or more series of three injections with an interval of about a month between series. The serum injections were given three times a week intragluteally with a dose of 10 cc. . . . .

"It is quite obvious that no definite conclusions can be drawn from the above described experiment with the antileprosy serum of REENSTIERNA. The material used is far too small and the duration of observation too short. Moreover in one and the same patient improvement was observed in one symptom or group of symptoms paralleling a retrogression in other disturbances, as a result of which any accurate judgement was rendered very difficult. Again, the connection between improvement and treatment by the serum injections is not always convincing, since the possibility of spontaneous retrogression of the symptoms must not be forgotten. We may summarize the course of the disease in our seven patients during their serum treatment, in brief, into four groups :

"*a.* Two showed improvement ;
"*b.* Three showed improvement coupled with retrogression ;
"*c.* One remained stationary (temporary improvement) ;
"*d.* One got worse."

BLUETH (Alfred). *Betaxin* **in the Treatment of Leprosy.**—*Leprosy Review.* 1939. Apr. Vol. 10. No. 2. pp. 109–112.

The author reports on a trial of the synthetic crystalline vitamin B_1 substance, Betaxin, in the treatment of leprosy cases with polyneuritic and polyneuralgic symptoms. Brief notes of three cases are given in which beneficial results are reported in vaso-dilatory symptoms of nerve origin in the hands and feet, but general and arthritic symptoms were unaffected. *L. R.*

RADNA (R.). Sur le traitement de la réaction lépreuse. [**Treatment of Lepra Reactions.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. June 30. Vol. 19. No. 2. pp. 227–233.

The treatment of seven cases with intravenous transfusions of blood in quantities of 100 to 180 cc. is reported rapidly to bring down the temperature with subsidence of the local congestions and severe pain. Subsequently chaulmoogra treatment is better borne by the patients. *L. R.*

OBERDÖRFFER (Manfred J.) & COLLIER (Douglas R.). **Prevention and Treatment of Ulcers and Deformities in Leprosy.**—*Leprosy Review.* 1939. July. Vol. 10. No. 3. pp. 151–163. With 12 figs. [37 refs.]

The authors suggest that deformities of the hand and foot largely result from paresis of the intrinsic muscles secondary to nerve lesions leading to atrophy of the bones due to diminished circulation. They therefore advise daily exercises, when the conditions permit, to help to restore the lost functions. Information regarding suitable exercises is given. When ulcers are present 2 per cent. mercurochrome with honey, cod liver oil, zinc oxide powder, bismuth subnitrate and vaseline are recommended as a dressing. *L. R.*

LOWE (J.) & CHATTERJI (S. N.). **Surgical Removal of the Sheath of Ulnar Nerve in Severe Leprous Neuritis.**—*Leprosy in India.* 1939. Apr. Vol. 11. No. 2. pp. 44–52. With 6 figs. on 2 plates.

SARKAR (Sarasi Lal) & BHATTACHARYYA (Beni Madhab). **The Action of Cobra-Toxyl on the Nerve Pain of Leprosy.**—*Jl. Indian Med. Assoc.* 1939. Apr. Vol. 8. No. 7. pp. 412–413.

A brief report of three cases with slight benefit in only one. *L. R.*

BOMBAY: REPORT OF THE HAFFKINE INSTITUTE FOR THE YEAR 1938 [SOKHEY (S. S.), Director].—**Some Experimental Observations on Human and Rat Leprosy and their Significance in the Pathogenesis and Treatment of the Disease** [ROW]. pp. 50–51.

i. MANALANG (Cristobal). **Draft of a Plan for the Liberalization of Leprosy Control.**—*Monthly Bull. Bureau of Health.* Manila. 1938. Oct. Vol. 18. No. 10. pp. 541–544.

ii. MONTHLY BULLETIN OF THE BUREAU OF HEALTH. Manila. 1938. Oct. Vol. 18. No. 10. pp. 545–551.—**Report of the Council of Hygiene on the Present Status of Leprosy based on Dr. Manalang's Plan of Leprosy Control.**

i. Manalang's plan is based on the assumption that leprosy is acquired chiefly, if not entirely, during infancy and early childhood through contact with a leper, the manifest lesions appearing usually many years later and "that for practical purposes in control work, adults may be considered immune." He therefore proposes to release all adult lepers who want to stay in their homes, and utilize the money thus made available in protecting the children born to lepers from infection by isolating them from birth in government hospitals or by the employment of wet nurses or artificial feeding. An educational campaign, to spread the knowledge of the statements on which the plan is based, of from 5 to 20 or more years is considered necessary before the plan could be put into operation.

ii. The Council of Hygiene, which considered these proposals, while recognizing the importance of child infections, controverted Manalang's extreme views on this point. They considered that it would be impracticable adequately to control the lepers returned to their homes without at least as great expenditure as would be saved by releasing them, and they believe his proposals regarding bringing up the children of lepers artificially are also impracticable in a tropical country. They consider that the proposals of the Cairo Congress, which are largely in agreement with the present gradually liberalized Philippine policy, are the most suitable. *L. R.*

MONACELLI (Mario). La lotta contro la lepra in Sicilia e il nuova leprosario di Messina. [**Anti-Leprosy Measures in Sicily: the New Leprosarium at Messina.**]—*Settimana Med.* Palermo (formerly *Riv. Sanitaria Siciliana*). 1939. May 25. Vol. 27. N.S. No. 21. pp. 632–4, 637.

In Italy as a whole since 1923 leprosy has been notifiable, since 1926 treatment has been the responsibility of the State and since 1937 the segregation in hospital of infective patients has been compulsory. There are several endemic foci in Sicily and cases are not infrequently imported, but the author hopes that since there are facilities for treatment at Axum, Abyssinia, the disease will not be imported from that country.

The remainder of the paper is a description of the new leprosarium at Messina. *C. W.*

DAVEY (T. Frank). **Uzuakoli Leper Colony.**—*Leprosy Review.* 1939. July. Vol. 10. No. 3. pp. 171–185.

This is an interesting and important account of the work of a large leper colony in Nigeria with over 1,000 inmates in probably the most

heavily infected area of the country. It is pointed out that "If none but suitable cases were admitted it would be possible to render 100 per cent. of them symptom free," although some relapses would take place after discharge. However, to effect the greatest good the admissions include cases needing hospital treatment, educated lepers who can be trained in anti-leprosy work, infectious cases, destitute and infirm lepers and children without guardians, for they are often turned adrift by their families. The medical work is very heavy and 25 leper nurses have been trained to help. The laboratory work included 1,199 Kahn tests in the year 1938 and all complicating diseases are dealt with. Agriculture and industry are being increasingly developed and the colony is becoming more self-supporting.

An important development of work in the area surrounding the colony is necessary if more than the fringe of the problem is to be attacked and this has made considerable progress. It includes investigation of the incidence of the disease in numerous villages, where the people are induced to segregate their own cases locally in groups of 20 to 30 as a condition of receiving help from the colony in erecting such leper hamlets, in which the eager help of the chiefs has been enlisted. Treatment is then provided weekly in a chain of clinics near the patients, which are visited regularly by the staff of the colony. After such local segregation has been arranged, and a census taken, all contacts will be known and will be examined periodically to detect early cases. This scheme is very comprehensive, most economical as compared with accommodation in the colony and reaches a far larger number of cases. Good progress has already been achieved and the Uzuakoli colony is likely to become a model institution for the vast African leprosy stricken areas. *L. R.*

SOREL. Die Leprabekämpfung in den französischen Kolonien, Besitzungen und Mandaten. [**Treatment in French Colonies.**]—*Deut. Med. Woch.* 1939. Apr. 21 & 28. Vol. 65. Nos. 16 & 17. pp. 636–639; 676–678.

MARCHOUX (E.) & CHORINE (V.). Transmission de la lèpre par les poux et par les laelaps. [**Transmission of Leprosy by Lice and Laelaps.**]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 477–479.

This note records data to show that the insects *Haematopinus spinulosus* and *Laelaps echidninus* taken from infected animals do not transmit rat leprosy to healthy rats, although the bacilli survive in the latter for at least three days as shown by the inoculation of the broken up insects. *L. R.*

MARCHOUX (E.) & CHORINE (V.). Mode de pénétration des bacilles de Stefansky au travers de la peau fraichement épilée. [**Penetration of Rat Leprosy Bacilli through the Skin.**]—*Ann. Inst. Pasteur.* 1939. Aug. Vol. 63. No. 2. pp. 101–104. With 2 figs.

It has been shown that rat leprosy only penetrates the skin of rats when the hairs have been freshly removed, and the authors report an investigation to determine the mode of entry of the organisms. They found that on epilation most of the hairs broke off and left the root bulbs in the skin, in which case the bacilli did not penetrate the skin.

Where the roots are pulled out a minute wound is formed through which the bacilli were found, by studies of transverse sections, to penetrate. *L. R.*

PRUDHOMME (R. O.). Affaiblissement de la virulence du bacille de Stefansky par les rayons ultra-violets. [**Ultra-Violet Rays and Rat Leprosy Bacilli.**]—*Internat. Jl. Leprosy.* Manila. 1939. Jan.–Mar. Vol. 7. No. 1. pp. 67–71.

This note records experiments to show that irradiation for 2 to 5 minutes enfeebles, and that for 10 minutes destroys, the virulence of rat leprosy bacilli. *L. R.*

COWDRY (E. V.), RAVOLD (Amand) & PACKER (D. M.). **Physical and Chemical Properties of Rat Leprosy Bacilli.**—*Proc. Soc. Experim. Biol. & Med.* 1939. June. Vol. 41. No. 2. pp. 341–345.

This is a technical paper on attempts to determine the chemical alterations in leprous tissues and lepra bacilli by isolating the latter from the former and the use of spectroscopical analysis. Rat leprosy nodules were used. A significant alteration in the phosphorus and calcium ratios in the bacilli was found in the form of an increase in the phosphorus and a decrease in the calcium. The sodium and magnesium showed no change and only slight traces of potassium were found in either the bacilli or the control material. The mineral ash of nodules is mostly derived from the tissue cells, and a green fluorescence from the lepra bacilli. *L. R.*

BERNY (P.) & CHABAUD (A.). Essais de traitement de la lèpre murine. [**Treatment of Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1939. Mar. 8. Vol. 32. No. 3. pp. 316–322.

Trials of the essence of turpentine in oily solution, borneol in oily solution, chloroform extracts of chaulmoogra seeds and oil of Lettonia pine have been tried by injection in rat leprosy with negative results, except for some retardation of the disease for a time with borneol.

A number of new chemotherapeutic selenium compounds have also been tested, which were mostly very toxic, but nos. 1443 F. and 1424 F. exerted some beneficial effect in the early stages of the rat infection. *L. R.*

CHABAUD (A.). Essais de traitement de la lèpre murine. [**Trials of Rat Leprosy Treatment.**]—*Bull. Soc. Path. Exot.* 1939. June 14. Vol. 32. No. 6. pp. 591–592.

This paper reports negative results from the trials of aqueous extracts of cypress, coloncota and terebenthine. Borneol, however, had a certain power of retarding the progress without averting a fatal issue. *L. R.*

CHORINE (V.). Essais de traitement de la lèpre murine. [**Trials of Rat Leprosy Treatment.**]—*Bull. Soc. Path. Exot.* 1939. June 14. Vol. 32. No. 6. pp. 587–591.

The following substances were found inactive against rat leprosy, oxides of glucinum, yttrium, thallium, zirconium, mercurochrome,

iodorubidium and bismuthate of quinine. On the other hand toxic doses of uranium oxide produced a rapid softening of the lesions and elimination of the rat leprosy bacilli, which were found to be dead.

L. R.

CHABAUD (A.). Evolution sur la souris de quatre souches de lèpre du rat. [**Rat Leprosy in Mice.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 195–201.

LOWE (John). **A Bandicoot found infected with Stefansky's Bacillus.**—*Internat. Jl. Leprosy.* Manila. 1939. Jan.–Mar. Vol. 7. No. 1. p. 75.

MALARIA.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

GILROY (p. 52) describes conditions in nine Darjeeling tea gardens where the malaria attack rate was 370 per 1,000, and the spleen rate 68 per cent. *P. falciparum* is the commonest parasite and *A. minimus* the vector. Kala azar is common. RUSSELL and JACOB (p. 53) show that in a coastal area in Madras man-made malaria, due to the digging of pits to the subsoil water level for the watering of casuarina trees, is the cause of decline in prosperity. *A. culicifacies* is the chief carrier and *P. falciparum* the commonest parasite.

BOCK (p. 53) regards *P. ovale* as a valid species, immunologically distinct from *P. vivax*. It is usually found in Africa, but as it becomes better known, will probably be discovered in other countries. He gives an account of 20 definite cases of *P. ovale* infection. Discussing the results of 108 primary and 53 reinoculations with *P. ovale*, SINTON *et al.* (p. 54) found only one instance of true relapse, even in the absence of drug treatment.

Comparing the Roman and Ethiopian strains of *P. falciparum* MOSNA (p. 55) concludes that the former is the more virulent, and the latter resembles tropical strains from Africa and India. Crescents were found by BASU (p. 55) to be incapable of infecting *A. stephensi* during the first 4 days of their appearance in the blood, but thereafter were highly infective until the 26th day. He thinks that a host who has recovered from initial infection is not immune against reinfection with the same strain. CHOPRA and BASU (p. 55) found that prontosil failed to prevent infection of *A. stephensi* when given to crescent carriers.

FIELD and LE FLEMING (p. 56) discuss the appearance of *P. vivax* in thick films.

DE BURCA (p. 56) shows that in Quetta cantonment in 1938 *A. superpictus* was by far the commonest anopheline. *A. culicifacies* was much less in evidence than in previous years. Regular spraying of barracks was a satisfactory measure.

SINTON (p. 56) summarizes his views on immunity. There is an antiparasitic and an antitoxic element, and defence is cellular and humoral. He regards the tolerance of indigenous populations of endemic areas as natural rather than acquired, but infections produce acquired immunity the duration of which varies with the species of

plasmodia. As a result of experiments with *P. knowlesi* in rhesus monkeys he (p. 57) enunciates general principles: treatment of individuals only rarely exposed to infection should aim at radical cure; in those constantly exposed it should aim only at clinical (and not radical) cure of each attack; in those exposed temporarily to frequent infections drug prophylaxis should be employed.

WOLFF (p. 57) describes a test in which 2 drops of serum are mixed with 1·0 cc. of buffer solution at different *p*H values. Normal sera usually show faint cloudiness at *p*H 7·0, positive sera show cloudiness up to 8·0 or 8·4. The results are very like those of Henry's test.

Bird and Monkey Malaria.—REDMOND (p. 58) shows that in the bird malarias the degree of immunity is directly correlated with the virulence of the strains, and that cross immunity between species occurs.

CASINI (p. 58) claims to have found bodies resembling the exoerythrocytic schizonts of bird malaria, in the endothelial cells of the brain of a girl dying during chronic malaria. JACOBI (p. 59) describes the course of *P. gallinaceum* infections of fowls. Exoerythrocytic schizonts are regularly found between the 25th and 30th days. JAMES (p. 59) found that in the acute phase birds infected with sporozoites, and in the chronic phase those infected by blood inoculation, show the greater mortality. Exoerythrocytic schizonts are found to be connected with these high mortalities, and can arise from forms which have developed in red blood cells. MANWELL (p. 60) though suggesting further work, does not believe that exoerythrocytic schizonts represent developmental forms of toxoplasma. With GOLDSTEIN he (p. 60) shows that they are most common just after parasites first appear in the blood.

MENON (p. 61) describes the splenic reaction in *P. knowlesi* infection of monkeys.

RODHAIN and MUYLLE (p. 61) show that *P. vivax* can survive in chimpanzees for at least 46 days. *C. W.*

GILROY (Alan). **Health in Tea Gardens of the Darjeeling Terai with Special Reference to Malaria.**—*Jl. Malaria Inst. of India.* 1939. June. Vol. 2. No. 2. pp. 165–179. With 2 charts.

This is an account of the health conditions of nine tea gardens, in the Darjeeling Terai, with a fairly stable population of about 9,300. In 1938 the birth rate was 41 and the death rate 33 per thousand. The infant death rate was 122. Of the 309 deaths 66 were attributed to malaria and 48 to kala azar. The malaria attack rate was 370 per thousand, with a case mortality rate of 2 per cent. There is no evidence that kala azar is decreasing though thorough treatment is keeping the disease in check. It is common among new-comers, some of whom come to the estate solely for treatment and abscond when cured.

Of the 66 malaria deaths (21 per cent. of the total mortality) 40 occurred in infants or children. The spleen rate of 1,068 children examined was 68 per cent. The children known to be suffering from kala azar were excluded from this examination. The parasite rate of 558 children was 49 per cent. Of the 273 positive examinations *P. falciparum* was found in 188, *P. vivax* in 20, and *P. malariae* in 18. Mixed infections were found in 47.

Fourteen species of Anopheles were identified. The only species found infected was *A. minimus*, 35 infected among 421 dissected. It was not possible to correlate malaria incidence with the presence of mosquitoes in houses. The malaria curve was rising at a time when most breeding places were dry and anophelines could not be found in houses. The diagnosis of malaria in estate dispensaries was made on clinical grounds and it is possible that influenza and malaria are not infrequently confused. *Norman White.*

RUSSELL (Paul F.) & JACOB (V. P.). **Epidemiology of Malaria in the Ennore-Nellore Coastal Area, Madras Presidency, India.**—*Jl. Malaria Inst. of India.* 1939. June. Vol. 2. No. 2. pp. 131–152. With 3 figs. on 2 plates & 2 charts. [16 refs.]

The Ennore-Nellore Coastal Area is a narrow strip of land some 120 miles long and 1½ to 3 miles in width, between the Buckingham Canal and the Bay of Bengal, immediately to the north of the City of Madras. It contains numerous villages none of which enjoys the prosperity it formerly had. For this malaria is responsible and malaria here is man-made.

The soil is sandy. Casuarina trees grow well; other crops are all but non-existent. Casuarina is grown for fire-wood. To water the young trees shallow wells or pits are dug to the sub-soil water which is found from 2 to 6 feet below the surface. These casuarina pits are the chief anopheline breeding places, and they are very numerous.

Anophelines collected and examined numbered 27,187 larvae and 7,227 adults. Of the larvae 18,323 were *A. subpictus*, and 6,980 *culicifacies*. Other species found were:—*annularis*, *barbirostris*, *hyrcanus*, *jamesi*, *karwari*, *pallidus*, *stephensi*, *tessellatus*, *vagus* and *varuna*. *A. culicifacies* is the chief carrier though its infection rate was not high. Of 984 dissected the oöcyst index was 0·68 per cent. and the sporozoite index 0·10 per cent. Positive precipitin reactions with *culicifacies* were human 80 per cent., cow 20 per cent.; with *subpictus*, human 3·1 per cent., cow 96·0 per cent.

Spleen indices averaged 63·4 per cent. and positive blood smears 63·2 per cent. Of the positive smears 56·7 per cent. contained *P. falciparum*, 36·1 per cent. *vivax*, and 4·4 per cent. *malariae*.

N. W.

WATSON (Robert Briggs), FAUST (Ernest Carroll) & SIMMONS (James Stevens). **Recent Advances in the Epidemiology of Malaria.**—*Southern Med. Jl.* 1939. Aug. Vol. 32. No. 8. pp. 853–857. [21 refs.]

BOCK (Erich). Zur Epidemiologie, Klinik und Parasitologie der durch das *Plasmodium ovale* Stephens 1922 hervorgerufenen Malaria. [**Epidemiological, Clinical and Parasitological Features of Malaria produced by** *Plasmodium ovale* **Stephens, 1922.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Aug. Vol. 43. No. 8. pp. 327–352. With 15 figs. (1 map). [36 refs.]

In the first place the author deals with Stephens's discovery of *Plasmodium ovale* in 1922 and with the work of other investigators who followed him. He then proceeds to consider his own contribution

to the subject. He studied 20 certain and one doubtful case of *P. ovale* infection. Of these, 1 case came from Nigeria, 1 from Liberia, 2 from Spanish Guinea, 1 from Fernando Po, 15 from the Cameroons and 1 from East Africa. Of the places in the Cameroons from which *P. ovale* infected patients came, Tiko stands at the top with 8 out of a total of 15 cases. He considers that *P. ovale* is essentially an African species of malarial parasite and is found particularly in Central Africa. He thinks that, as the morphology of the parasite becomes better known to investigators, the positive findings in areas outside Africa will increase. A table is given showing cases of *P. ovale* infection recorded in literature in and outside Africa. In the consideration of the symptomatology of *P. ovale* infection he records the characteristic features, which are well known, such as the tendency for the infection to die out spontaneously in cases of therapeutically induced malaria. As regards the incubation period the average was found to be 10 days with extremes of 5 and 28 days. From his investigations he finds that *Plasmodium vivax* and *Plasmodium ovale* are immunologically different. As regards the morphology of the parasite he finds that during an infection the number of the nuclei of dividing forms varies. It is possible that this feature is connected with the effect on the parasite of the metabolic activities of the body of the host or is an expression of degeneration. From a consideration of the morphological, clinical and immunological features of the parasite he is of opinion that *Plasmodium ovale* should be recognized as a malarial species. *E. D. W. Greig.*

SINTON (J. A.), HUTTON (E. L.) & SHUTE (P. G.). **Studies of Infections with** *Plasmodium ovale*. **I. Natural Resistance to Ovale Infections.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Apr. 6. Vol. 32. No. 6. pp. 751–762. [40 refs.]

During seven years 108 primary infections with *P. ovale* have been induced at Horton Hospital and 53 reinoculations have been carried out. Four strains of *P. ovale* have been used, coming from the Belgian Congo, Nigeria, Sierra Leone and the Gold Coast, respectively. Most of the patients were Europeans who had never previously been exposed to infection with *P. ovale* and very few had been infected with malaria of any kind. Infections were either transmitted from patient to patient by blood injection or by infected mosquitoes, *A. maculipennis* var. *atroparvus*. Eighty-six patients were inoculated with blood parasites and 22 with mosquito parasites.

These *ovale* infections were characterized by a great infrequency of clinical relapses, even in the absence of drug treatment. It was possible in some untreated cases to detect, by frequent prolonged examinations, the presence of parasites for as long as two to three months, but in only two cases were there any clinical manifestations after the primary attack. There was only one instance of a true relapse. There was no evidence of the prolonged primary latency which is frequently observed in *vivax* infections. Varying grades of susceptibility to the pathogenic effects of infection with *P. ovale* were observed but there was no great natural resistance to the acquisition of infection.

In an appendix the recorded geographical distribution of *P. ovale* is discussed. The main area of natural distribution of this parasite is Equatorial and Central Africa. *N. W.*

MOSNA (Ezio). Sulla malaria indotta da *Plasmodium immaculatum* (*falciparum*) ceppo etiopico e ceppo campagna romana. [**Induced Malaria with Strains of *P. falciparum* from Ethiopia and the Roman Campagna.**]—*Riv. di Parassit.* Rome. 1938. Dec. Vol. 2. No. 4. pp. 275–287. With 10 charts. English summary (9 lines).

Two groups, each of four individuals, were inoculated with Ethiopian and Roman strains of *P. falciparum*, respectively. In each case citrated infected blood was injected intramuscularly.

With the Ethiopian strain the incubation periods were 11, 10, 9 and 10 days; with the Roman strain 10, 11, 12 and 12 days.

No morphological differences between the two strains were noted.

From the clinical point of view there was a considerable difference between the two groups. The febrile attacks produced by the Roman strain were longer, more severe and required two or three times as much quinine to control them. Relapses were likewise more numerous after infections with the Roman strain.

The author states that his observations show that the Ethiopian strain, from the clinical point of view, is similar to the tropical strains of Africa and India as described by KOCH and JAMES. *N. W.*

BASU (B. C.). **Studies on the Biology of the Malaria Parasite** (*Plasmodium falciparum*).—*Jl. Malaria Inst. of India.* 1939. June. Vol. 2. No. 2. pp. 155–157.

Batches of *A. stephensi* infected with *P. falciparum* were fed on four volunteers whose blood had been examined daily for a month and found to be free from malaria parasites. The incubation period varied from 12 to 14 days. Small ring forms appeared in the blood before the initial rise in temperature. Crescents were observed 7 to 13 days later. Crescents persisted for 40 days even after atebrin and quinine treatment. For four days after their first appearance crescents were not infective for *A. stephensi*; thereafter till the 26th day they were highly infective. From the 27th to the 40th day they again became non-infective. A host who has recovered from the initial infection is not immune against reinfection with the same strain. *N. W.*

CHOPRA (R. N.) & BASU (B. C.). **Studies on the Effect of Anti-Malarial Drugs upon the Infectivity of Patients to Mosquitoes. Part III. "Prontosil."**—*Jl. Malaria Inst. of India.* 1939. June. Vol. 2. No. 2. pp. 153–154.

Five hundred and eleven laboratory-bred *A. stephensi* were fed on five crescent carriers before and after the administration of prontosil in various doses. As large a dose as 40 tablets failed to devitalize the crescents which developed to the sporozoite stage in a considerable proportion of mosquitoes. *N. W.*

SINTON (J. A.), HUTTON (E. L.) & SHUTE (P. G.). **Proseptasine as a True Causal Prophylactic in Malignant Tertian Malaria.**—2 mimeographed pp. League of Nations. Health Organisation, Malaria Commission. C.H./Malaria/271. Geneva. 1939. Jan. 24.

This appears to be an account of the work already abstracted in this *Bulletin*, 1939, Vol. 36, p. 925. *N. W.*

FIELD (J. W.) & LE FLEMING (H.). **The Morphology of Malarial Parasites in Thick Blood Films. Part I. The Thick-Film Morphology of** *Plasmodium vivax.—Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 467–480. With 5 figs. & 2 coloured plates.

This paper is the first of a series describing the appearance of human malarial parasites in thick films. It deals with *P. vivax*, and in two coloured plates are arranged side by side the various stages in thin films and in thick films. The technique of preparing the films is described, while the various departures of the different stages of the parasite from the normal owing to this technique are carefully discussed. A study of the paper and the very instructive plates will enable any one to identify in thick films any stage of the parasite under observation.

C. M. Wenyon.

DE BURCA (B.). **Note on Anti-Malaria Measures in Quetta Cantonment during 1938.**—*Jl. Malaria Inst. of India.* 1939. June. Vol. 2. No. 2. pp. 121–130. With 8 figs. on 4 plates, 1 map & 2 charts.

Of 7,735 anophelines captured in Quetta Cantonment in 1938 89 per cent. were *A. superpictus*, 6 per cent. *turkhudi*, 2 per cent. *culicifacies*, and 1·4 per cent. *stephensi*. The low prevalence of *culicifacies* contrasts with the findings of previous years when this species was much more in evidence. Nearly all anopheline breeding takes place outside cantonment limits : *superpictus* is a large mosquito with a longer range of flight than either *culicifacies* or *stephensi*. In one area where large numbers of *superpictus* were found in July the nearest breeding place was 1½ miles distant. This does not explain, however, the rarity of *culicifacies*, the larvae of which were very seldom found anywhere.

The control measures adopted are described. A local fish, *Discognathichthys rossicus* var. *nudiventris* Berg was found, experimentally, to be as efficient as Gambusia in destroying larvae and pupae. This is interesting as this fish has its mouth on the ventral surface and so is a bottom feeder. Spraying barracks was regularly carried out with apparently satisfactory results. The spray used was Pyrocide 20, one part, kerosene oil, 19 parts.

Malaria incidence among the troops was much lower than in previous years and was highest in June and July, two months earlier than usual.

N. W.

SINTON (J. A.). **Immunity or Tolerance in Malarial Infections.**—*Proc. Roy. Soc. Med.* 1938. Sept. Vol. 31. No. 11. pp. 1298–1302 (Sect. Comp. Med. pp. 50–54).

An interesting summary of existing knowledge and current speculation regarding malarial immunity. Two factors are involved in this immunity, an antiparasitic element whereby the parasites are kept at such a level that few or no clinical symptoms develop, and an antitoxic element neutralizing hypothetical toxins. The defensive mechanism is cellular and humoral. The cellular factor is the phagocytic activity of the macrophage system : this is at first non-specific and sluggish but later becomes very active and specific, if the

host survive. The antibodies are probably produced by the macrophage system as a result of the stimulation of ingested parasites. The specific humoral factor has probably the nature of an opsonin. The existence of antitoxic substances would explain the fact that early in the infection a small number of parasites produces a much more severe reaction than does a much larger number later in the attack.

The author discusses and compares natural resistance and acquired tolerance. The tolerance found among a large proportion of the indigenous population of highly malarious areas is given as an example of natural resistance or immunity. Premunition is described. The residual immunity found after infection with *P. falciparum* is more fleeting than that left by *vivax* infections: the residual immunity following *P. ovale* infections appears to be the most durable. *N. W.*

SINTON (J. A.). **A Summary of our Present Knowledge of the Mechanism of Immunity in Malaria.**—*Jl. Malaria Inst. of India.* 1939. Mar. Vol. 2. No. 1. pp. 71–83. [15 refs.]

This paper covers the same ground as the above, but in less condensed form. *N. W.*

SINTON (J. A.). **Studies in Immunity in Malaria. Part VI. The Effect of Drugs upon the Development of Immunity and its Relationship to the Principles of Treatment.**—*Jl. Malaria Inst. of India.* 1939. June. Vol. 2. No. 2. pp. 191–216. With 1 chart. [42 refs.]

The early part of this paper records observations upon *P. knowlesi* infections in young non-immune rhesus monkeys with special reference to factors determining the rate at and the degree to which immunity develops. The effects of treatment on the intensity of the parasite prevalence and on its duration, and the period of infection at which therapy is started are both important. The amount of antigenic stimulation, or parasitic intensity, and the duration of such stimulation determine the degree of immunity acquired and the rate of its acquisition. The bearing of these observations on the divergent views held regarding malaria treatment is discussed. The author enunciates general principles regarding the treatment of malaria in different conditions:

"When infections are contracted by individuals resident under conditions in which the chances of reinfection, except at comparatively long intervals, are slight, the treatment of choice is one which produces a *radical cure* of the infection at the earliest possible moment.

"When individuals are resident under conditions where they are exposed to frequent and constant risk of infection, reinfection and superinfection, the object of treatment should be the rapid production of a *clinical cure* of each attack, and *not* a radical cure of the infection.

"When individuals are exposed only temporarily to chances of frequent infection and superinfection, then *clinical prophylaxis* of the disease with an appropriate drug is the treatment of choice." *N. W.*

WOLFF (E. K.). **Buffer Precipitation Test (B. P. T.) for Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Apr. 6. Vol. 32. No. 6. pp. 707–716. With 4 charts.

The simple test described is a development of Chorine's modification of Henry's test for malaria. Chorine's determination of the distilled

water precipitation of euglobulin necessitates the use of a photometer. The buffer precipitation test described requires no elaborate apparatus. The procedure is one of the standard methods of determining isoelectrical points. Stock buffer solutions are prepared. Baird and Tatlocks's universal buffer mixture was used for this purpose. The *p*H concentrations used by the author were 8·4, 8·0, 7·4, 7·0, 6·4, 5·8, 5·4 and 5·0. As the solutions do not keep well in a tropical climate 0·2 per cent. formalin was added before the final adjustment. One cc. of each of the diluted buffer solutions is placed in one of a series of small test tubes. Two drops of serum are added to each tube. The tubes are shaken and then left standing for 5 minutes when the results are read. The serum is taken early in the morning before breakfast on the day before the test: 3 cc. of venous blood is placed in a dry centrifuge tube. After the clot has formed and been loosened the tube is kept overnight in a refrigerator. If the serum is not quite clear it is centrifuged before carrying out the test. The results are recorded as opalescent, faintly cloudy, cloudy, or markedly cloudy. Normal sera rarely show more than a faint cloudiness at *p*H 7·0 and only an opalescence at 7·4. Strongly positive sera show cloudiness or marked cloudiness up to 8·0 or 8·4 or beyond. Weakly positive sera show cloudiness up to 7·4. The maximum precipitation is not reached at the same *p*H concentration by all sera. Generally the maximum reached by the negative serum is at a lower *p*H than the maximum reached by a positive serum. For practical purposes two tubes, *p*H 7·0 and 7·4, would be sufficient. The B.P.T. has been used by the author parallel with the Henry test on 350 sera, with closely comparable results. *N. W.*

REDMOND (W. B.). **The Cross-Immune Relationship of Various Strains of** *Plasmodium cathemerium* **and** *P. relictum.*—*Jl. Infect. Dis.* 1939. May–June. Vol. 64. No. 3. pp. 273–287. With 1 fig. [13 refs.]

An examination of a strain of *Plasmodium relictum* var. *matutinum* (strain R) and one of *P. cathemerium* (strain A) has shown that as regards virulence and immunity resulting from infection these strains differ from other strains of the same species. The degree of immunity is directly correlated with the virulence, the strain R, the least virulent, producing the lowest immunity. Cross immunity also occurs, for birds carrying latent infections of strain A of *P. cathemerium*, the most virulent of the forms examined, are completely immune to strain W of *P. relictum*. Strain N of *P. cathemerium* is less virulent than strain W of *P. relictum*, but if multiple superinfections with strain N are carried out the immunity against strain W can be increased.

C. M. Wenyon.

CASINI (G.). La fase apigmentata di evoluzione dei plasmodidi nella malaria cronica. [**Non-pigmented Evolutional Phase of Plasmodia in Chronic Malaria.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 2. pp. 73–75. With 3 plates (1 coloured). English summary (8 lines).

In his summary the author records that he has found in the endothelial cells of the brain of a ten-year-old girl, who died from haemoglobinuria during chronic malaria, cytoplasmic bodies with

chromatin granules resembling the exoerythrocytic schizonts of bird malaria. He concludes that the structures in the human case were actually of this nature and that they represent primary developmental stages of the sporozoites as well as the stages which are responsible for relapses. The bodies in question, which were found in smears of the brain, are shown in two plates, one of microphotographs and the other of coloured drawings. There is certainly some resemblance to schizonts, but on the other hand it is difficult to be sure that granulation and fragmentation of the cytoplasm of endothelial cells are not responsible for the appearances. *C. M. W.*

JACOBI (L.). Beiträge zur Pathologie der Infektion des Huhnes mit *Plasmodium gallinaceum* (Brumpt). [**Pathology of** *P. gallinaceum* **Infection of Fowls.**]—*Arch. f. Experim. Path. u. Pharm.* 1939. Jan. 16. Vol. 191. No. 3/4. pp. 482–491. With 2 figs.

After intramuscular injection with blood containing *Plasmodium gallinaceum* two to six months old fowls weighing 500 to 1,000 grams are mostly at the height of their infection between the ninth and seventeenth days. During this period a normal erythrocyte count of 3 millions falls to under 1 million. The bird is listless, out-of-sorts and feeds badly. When the infection decreases a rapid return to health occurs. For birds well looked after the mortality rate is very low, if not nil. As regards exoerythrocytic schizonts (named EE forms by the author) these are regularly present between the 25th and 30th days. In one bird they were found on the 37th day. *C. M. W.*

JAMES (S. P.). **The Incidence of Exo-Erythrocytic Schizogony in** *Plasmodium gallinaceum* **in Relation to the Mode of Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Apr. 6. Vol. 32. No. 6. pp. 763–769. With 2 diagrams.

In a series of 93 fowls infected with *Plasmodium gallinaceum* by injection of infected blood 75 died, while of 66 infected by sporozoites 46 died. The death rate is thus higher (80 per cent.) after blood inoculation than after sporozoites (70 per cent.). Of the 75 fowls that died after blood inoculation 49 died in the acute phase of the infection (1–11 days) while 24 died in the chronic phase (14–21 days) and 2 later. Of the 46 that died after sporozoite infection nearly all, namely 42, died in the acute phase and 4 later. It thus appeared that in the acute phase sporozoite infected birds died more readily than the others (91 per cent. to 65 per cent.) while in the chronic phase the blood infected birds died more than those infected by sporozoites (34 per cent. to 8 per cent.) These differences appear to be correlated with the presence of exoerythrocytic schizonts (EE forms). These occurred in all but two of the fowls which died in the acute phase following sporozoite injections, whereas they were found in only 15 of the 49 that died in the acute phase following blood inoculation and in all of those that died later. It thus appears that the high rate of mortality in the acute phase following sporozoite inoculation is due to the great frequency of EE forms, while a similar frequency seems to be the cause of the high mortality rate in the chronic phase after blood inoculation. Sporozoite inoculation thus produces EE forms in the acute phase and blood inoculation more especially in the chronic phase. It has been suggested that EE forms arise only from sporozoites or from pre-existing EE forms in inoculated blood, but the author arrives at the

conclusion that this view is untenable and that EE forms can arise from parasites which have developed in the red blood corpuscles, because in 70 per cent. of the infections resulting from blood inoculation EE forms do not appear till after the acute phase has passed.

C. M. W.

MANWELL (Reginald D.). **Toxoplasma or Exoerythrocytic Schizogony in Malaria ?**—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 2. pp. 76–88. With 19 figs. on 4 plates. [33 refs.]

The presence of exoerythrocytic schizonts in bird malaria infections has led to the suggestion that in such cases there have been double infections with malarial parasites and Toxoplasma and that the schizonts represent developmental forms of the Toxoplasma. In this paper the author examines the evidence for and against this view and concludes that it must be considered unlikely that the exoerythrocytic forms represent a mixed infection. Before a final answer can be given, however, he thinks that further experimental work will be necessary. It is noted that these schizonts have now been found in association with five distinct species of bird malarial parasites. *C. M. W.*

MANWELL (Reginald D.) & GOLDSTEIN (Frederick). **The Asexual Life Cycle of the Avian Malaria Parasite,** *Plasmodium circumflexum.*—*Science.* 1939. Feb. 10. N. S. Vol. 89. No. 2302. pp. 131–132.

In this note the authors record the discovery of exoerythrocytic schizonts in four strains of *Plasmodium circumflexum* in canaries. It is noted that these stages occur most commonly just after parasites first appear in the peripheral blood and that they frequently occur in localized areas in great numbers. The possible relationship of these schizonts to Toxoplasma is discussed without any definite opinion being expressed, though it is pointed out that Toxoplasma usually, if not always, reproduces by binary fission. *C. M. W.*

LUCENA (Durval). Malaria aviaria. II. *Plasmodium cathemerium* Hartman, 1927, parasita do tico-tico (*Brachyspiza pileata*) e do pardal (*Passer domesticus*), e *Plasmodium elongatum* Huff, 1930, parasita do tico-tico, em São Paulo. III. Da presença dos *Plasmodium praecox*, *P. nucleophilum* e *P. vaughani* em passaros de S. Paulo. [**Avian Malaria. II.** *P. cathemerium*, **Parasite of the Tico-tico and the Sparrow,** *P. elongatum*, **Parasite of Tico-tico in S. Paulo. III.** *P. praecox*, *P. nucleophilum* and *P. vaughani* **Present in Birds of S. Paulo.**]—*Folha Med.* 1938. July 15 & Dec. 5. Vol. 19. Nos. 20 & 34. pp. 233–238. [15 refs.] English summary; pp. 404–406. [13 refs.] English summary.

In the first of these long papers, the author records the discovery of *Plasmodium cathemerium* in the tico-tico (*Brachyspiza pileata*) and the sparrow (*Passer domesticus*) from various points of South America. In the tico-tico from S. Vincent *P. elongatum* was found. The former parasite was inoculable to canaries.

In the second paper it is recorded that *P. nucleophilum* was found in the sparrow and both *P. vaughani* and *P. praecox* in *Turdus rufiventris* and *T. leucomelas.* *C. M. W.*

MENON (T. Bhaskara). **The Visceral Lesions in Simian Malaria with Special Reference to the Splenic Reaction.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 481–495. With 8 figs. on 4 plates. [61 refs.]

A histopathological study of the organs from 12 monkeys which died of *Plasmodium knowlesi* infection has shown that a vascular mechanism is responsible for the localization of large numbers of parasites in the spleen, in which there is a lymphoid reaction and activation of the reticulo-endothelial system as evidenced by histiocyte differentiation and active phagocytosis. The severity of infection in these animals is not due to failure of the reticulo-endothelial response but to some other factor, which may be the virulence of the parasite for this particular host. A toxic factor is suggested by degenerative swelling of the capillary endothelium with necrosis of the cytoplasmic reticulum round the follicules. *C. M. W.*

RODHAIN (J.) & MUYLLE (G.). Sur la spécificité des *Plasmodium* des anthropoïdes de l'Afrique centrale. [**Specificity of the Plasmodia of the Anthropoids of Central Africa.**]—*C. R. Soc. Biol.* 1939. Vol. 131. No. 15. pp. 114–117.

The authors relate how in previously recorded experiments they have failed to infect human beings with *Plasmodium schwetzi*, the malarial parasite of the chimpanzee which resembles *P. vivax* of man. The reverse experiment of infecting the chimpanzee with *P. vivax* was once successful in the hands of MESNIL and ROUBAUD. In this case typical parasites were present for nine days. There seemed, however, to be a possible fallacy in this experiment, for the injection of human blood might have stimulated a latent *P. schwetzi* infection. The authors of the present paper have repeated the experiment of inoculating *P. vivax* to a chimpanzee. After forty-six days blood inoculated to two general paralytics produced typical *P. vivax* infections after incubation periods of fifteen and eighteen days. The inoculated chimpanzee was known to have a *P. reichenowi* infection and possibly a latent *P. schwetzi* infection also. During the forty-six days both *P. reichenowi* and a form which might be either *P. schwetzi* or *P. vivax* were observed in the blood. The fact that *P. vivax* infections were produced in man proved that the parasite can survive in the chimpanzee for at least forty-six days. *C. M. W.*

HELMINTHIASIS.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

FAUST *et al.* (p. 62) compared 11 techniques for the diagnosis of protozoa or helminths in faeces. Two were direct faecal films, the others had strained faeces as a basis. They conclude that a combination of direct film with zinc sulphate centrifugal floatation is to be recommended for the clinical laboratory and in epidemiological surveys. SWARTZWELDER (p. 62) found that zinc sulphate centrifugal floatation revealed the largest numbers of protozoa and helminth infections, but faeces were strained through gauze before using the method. SAWITZ

et al. (p. 62), for *E. vermicularis* infections prefer the NIH swab to any method in which faecal examinations are made. Details may be found in the abstracts concerned. In comment LANE points out the inadvisability of straining faecal suspensions and the desirability of enumeration of organisms in the comparison of techniques. NITZULESCO *et al.* (p. 65) propose to use the Hamburg technique after a comparison made with others, but LANE criticizes their work on the ground that the techniques were not carried out according to the instructions given by the originators and that the Hamburg technique was not used to the best advantage.

STARKOFF (p. 65) gives details for the preparation of platyhelminths.

VOGEL and RIOU (p. 67) give a table of over 150,000 stool examinations performed in French colonies. HOFFMAN and JANER (p. 67) report findings in Porto Rico and NITZULESCO and NITZULESCO (p. 68) in a region near Jassy.

The clinical and pathological features of renal damage due to poisoning by carbon tetrachloride are described by SMETANA (p. 68). Discussing anthelmintics SMILLIE (p. 68) points out the danger of oil of chenopodium and advises the use of hexylresorcinol. HARE and DUTTA (p. 69) compared tetrachlorethylene with oil of chenopodium, controlling the results by D.C.F., and found the former to be the more effective; it is also cheaper. SWALES (p. 69) found phenothiazine to be effective and non-toxic in experiments on sheep. *C. W.*

i. FAUST (Ernest Carroll), SAWITZ (Willi), TOBIE (John), ODOM (Vada), PERES (Charles) & LINCICOME (David R.). **Comparative Efficiency of Various Technics for the Diagnosis of Protozoa and Helminths in Feces.**—*Jl. Parasitology.* 1939. June. Vol. 25. No. 3. pp. 241–262. With 3 figs. [14 refs.]

ii. SWARTZWELDER (J. C.). **A Comparison of Five Laboratory Techniques for the Demonstration of Intestinal Parasites.**—*Jl. Trop. Med. & Hyg.* 1939. July 1. Vol. 42. No. 13. pp. 185–187. With 2 figs. & 1 plate.

iii. SAWITZ (Willi), ODOM (Vada L.) & LINCICOME (David R.). **The Diagnosis of Oxyuriasis. Comparative Efficiency of the NIH Swab Examination and Stool Examination by Brine and Zinc Sulfate Floatation for *Enterobius vermicularis* Infection.**—*Public Health Rep.* 1939. June 30. Vol. 54. No. 26. pp. 1148–1158. With 2 figs. [20 refs.]

These three reports come from New Orleans.

i. A report on further work notified as in progress [this *Bulletin*, 1939, Vol. 36, p. 144]. Its aim was the ability to recommend a technique or techniques for displaying intestinal infections with protozoa and helminths which should be simple and more dependable than those used in the diagnostic laboratory and the authors add that their study warrants a fulfilment of that promise.

Examination was made of 271 fresh faecal specimens coming from 242 persons, 214 being investigated once, 27 twice and 1 three times, and in these examinations eleven techniques were compared, and are quoted below by the numbers given to them in this paper. Two of them are direct faecal films: *No. 1*; spread faeces on a slide in normal saline over an area of 40 × 20 mm., put at once a coverglass over half and stain the rest with d'Antoni's iodine stain before putting another cover over it; *No. 4*; spread plain faeces on a slide, fix in hot

Schaudinn and stain with Faust's iron haemoxylin. In a third, *No. 2*; spread out 20 cmm. of a 1 in 5 suspension (which had been strained through a layer of cheese cloth with 31 meshes to the linear inch) after diluting it with an equal quantity of normal saline, and prepare the film as in No. 1. The other eight use as a basis a 1 in 5 faecal suspension made by mixing 5 grams of faeces with 10 cc. of normal saline; this mixture is forced gently through a brass sieve with 40 meshes to the linear inch and is then washed through with other 10 cc. of normal saline. *No. 3*; put 20 cmm. of this suspension on a slide, dilute with an equal quantity of normal saline and prepare as in No. 1; *No. 5*; dilute on a slide 10 cmm. of the suspension with 10 cmm. of fresh human serum and treat as in No. 4; *No. 6*; put 1 cc. of the suspension in a "calibrated Wassermann tube" of unstated dimensions, add tap water to 1 inch from the top, centrifuge and decant, repeat the washing, precipitation and decanting twice and then add d'Antoni's iodine solution to the 2 cc. mark; *No. 7*; treat 2 cc. of the suspension as in No. 6 except that the Wassermann tube of unstated dimensions is not calibrated, and repeat the washing and centrifuging till the overlying fluid seems clear, then by tapping mix the last precipitate with a little zinc sulphate solution having a specific gravity of 1180, fill the tube to within 0·5 cm. of the top using the same solution and centrifuge, by a medicine dropper add more of this fluid, drop by drop near the wall of the tube till a convex meniscus forms, touch this but not the tube with a slide, reverse this last so that the preparation becomes uppermost, add one drop of d'Antoni's iodine and cover; *No. 8*; follow No. 7 to the centrifuging in the zinc sulphate solution but collect the eggs by passing a bacteriological loop vertically down one side of the [necessarily concave] meniscus withdrawing it horizontally full of the surface fluid, placing this on a slide, repeating this collecting procedure twice and staining as usual; in *No. 9* "2 cc. of the basic 1-in-5 suspensions were centrifugalized and floatation was accomplished as described in Technic 7. Approximately 5 cmm. of fresh human serum were introduced on to a 25×75 mm. slide, and a loopful of material from the [presumably convex] surface film of the Wassermann tube placed directly on it," and treated as in No. 5; *No. 10* is an arbitrarily modified D.C.F. effected by pipetting 2 cc. of the suspension into a Wassermann tube of unstated dimensions having a ground top, water is added to within 1 cm. of the top, then follows centrifuging and decanting repeated till the overlying fluid is clear, when the tube is filled with saturated sodium chloride solution (s.g. 1200) a round cover laid on it which is held in place by 4 metal fingers and the tube is centrifuged once more, the cover is then transferred to a broad slide, but the real technique is not further modified by the staining which every other one gets; *No. 11* is as No. 10, with the exception that the floating fluid is zinc sulphate solution of s.g. 1180, that the round "cover-glass was carefully removed from the top of the tube with sharp vertical lift and inverted" stained as usual, a broad slide superimposed and the whole reverted.

In Table 1, which presumably refers to 271 faecal specimens, it is seen that Techniques 1, 2 and 3 discovered respectively 345, 337 and 332, and in all 427, protozoal infections. In 189 specimens all examined by techniques 1 to 10 the total number of protozoal infections was 486 and of helminthic ones 58. The respective figures were: *No. 1* 219, 4; *No. 2* 221, 3; *No. 3* 228, 4; *No. 4* 294, 3; *No. 5* 186, 1; *No. 6* 224, 6; *No. 7* 361, 43; *No. 8* 366, 50; *No. 9*

227, 8 ; *No. 10* 0, 48. As to *No. 11* no figures are given, it merely being said :—

" The first 73 specimens were examined by all three of these technics, but the findings for protozoa indicated that the touch and loop methods had the same practical efficiency as the superimposed coverglass removal. Hence, in all subsequent examinations, Technic 11 was discontinued, since it required specially prepared Wassermann tubes and metal supports in order to carry out the modified Lane technic and since it was more laborious than the other two methods. However, in case of a quantitative study of either protozoan cysts or helminths' eggs, our data (1, 10) indicate the greater accuracy of the superimposed coverglass method."

" Because of simplicity in operation and high efficiency of yields for both intestinal protozoa and helminths, a combination of the direct fecal film (either iodine-stained or hematoxylin-stained) with zinc sulphate centrifugal floatation (either by touch-removal or, preferably, by loop-removal) is recommended for the clinical laboratory and in epidemiological surveys."

The centrifuge used throughout was the " International Clinical Centrifuge " in which the distance from the axis to the bottom of the tube is 13·5 cm. Centrifuging was " for 45 seconds at a top speed of 2,640 revolutions per minute."

ii. The *first* technique was No. 1 of (i). In the others were used a 1 in 5 faecal suspension which had been filtered through two layers of " gauze," and of them the second, third and fourth used a precipitate from 3 cc. of the suspension obtained by centrifuging in water for 40 to 60 seconds at 1,500 revolutions a minute in a Wassermann test tube measuring 100 by 13 mm.

In the *second* technique the precipitate is washed, reprecipitated, suspended in an equal quantity of d'Antoni's solution and a drop examined. The *third* with the exception of the amount of suspension and speed of centrifuging is as No. 7 of (i) but it is noted that the film is removed without delay after the meniscus has been made convex, the fourth is as the third except that saturated salt solution (s.g. 1200) is used instead of zinc sulphate solution (s.g. 1180) ; it is called " Brine (direct) centrifugal floatation," but it is not D.C.F. and any effect of staining was again not noted. The *fifth* is by gravity precipitation of " approximately 10 cc. of the suspension " in a culture tube measuring 150 by 16 mm. ; it is stood for an hour, the supernatant fluid poured off and washing and standing repeated till the overlying fluid remains clear, a large drop of the final sediment is stained with iodine and examined. In all, 319 individuals were examined by all five methods. The positive findings for protozoa, which included *E. coli*, *E. histolytica*, *E. nana*, *I. bütschlii* and *G. lamblia* were respectively 63, 75, 85, 0, 76 ; those for helminths which included *A. lumbricoides*, *T. trichiura*, *N. americanus*, *H. nana* and *S. stercoralis* were 7, 9, 22, 19, 19. " The zinc sulphate centrifugal flotation method revealed the largest number of both protozoa and helminth infections."

iii. Anal scraping was by the N.I.H. swab, and with that were compared direct centrifugal floatations using the washed centrifugal precipitate of a 1 in 5 faecal suspension strained through a brass screen with 40 meshes to the linear inch and floated respectively with saturated common salt solution and with the same zinc sulphate solution as above.

" 1. An incidence of 96·3 percent. infection with *Enterobius vermicularis* has been found in an institutionalized group of 136 white children in New Orleans.

"2. The incidence in 109 boys was 96·3 percent.; that in 27 girls was also 96·3 percent.

"3. One hundred and thirty-one children were examined by the NIH swab method, and their stools were examined simultaneously by the brine and zinc sulfate centrifugal-floatation techniques. The superiority of the NIH swab technique is shown by the fact that the first swab examination detected an incidence of 71·8 percent., whereas stool examinations by brine and zinc sulphate floatations detected an incidence of only 13·7 and 17·6 percent., respectively.

"4. Repeated swab examinations, up to 7 times, each revealed additional infected children. Further examinations on the remaining negative children were negative, thus supporting the view that at least 7 swab examinations are necessary before the absence of pinworm infection is assured."

[In connexion with these three papers the reviewer has in hand one suggesting that the use of a strained faecal suspension is not equivalent to that of an unstrained one, that the mere discovery of infective organisms in place of their enumeration when present is not a sound basis for comparing the accuracy of techniques, and that the relative failure of a substitute D.C.F., one altered in essential details without control, is a rather unsatisfactory measure of the value of the D.C.F. itself.] *Clayton Lane.*

NITZULESCO (V.), MANOILESCO (C.) & POPOVICI (R.). Sur la recherche des oeufs d'helminthes par la méthode de Willis-Hung. [**Search for Helminthic Eggs by the Willis-Hung Method.**]—*Bull. Acad. Méd. Roumanie.* 1939. 4th Year. Vol. 7. No. 2. pp. 86–99.

The Hamburg method of faecal worm-egg concentration by gravity floatation [HUNG, this *Bulletin*, 1927, Vol. 24, p. 195] is compared with those of TELEMANN of 1908 and of DE RIVAS [this *Bulletin*, 1928, Vol. 25, p. 447].

In no case did these authors carry out the instructions of the originators of the techniques under test, so that their work does not in fact evaluate these techniques. They made no independent egg counts to serve as controls. In using the method which they name the Willis-Hung technique, more commonly referred to perhaps as the Hamburg technique, they made their examinations 2, 2½ and 3 hours after the eggs had been set to float; GUILLINY, it will be remembered, [this *Bulletin*, 1932, Vol. 29, p. 37] showed that the numbers of Ascaris, Trichuris and hookworm eggs that remain floating in saturated salt solution after an hour has passed is remarkably lessened. They believe on unstated grounds that their stock solution was a saturated one [that is that it had a specific gravity of just over 1200] but they certainly used for floatation a four-fifths saturated solution [which has a specific gravity of about 1160 and in fact floats relatively few Ascaris or Trichuris eggs]. "We propose the systematic employment of the Willis-Hung method in all research on helminth eggs in stools, so as to control and eventually complete the results obtained by the usual chemical methods (Telemann or [de] Rivas)." *C. L.*

STARKOFF (Oleg). Nuovi metodi per la preparazione di platelminti. [**New Methods of preparing Flatworms.**]—*Boll. Istituto Sieroterap. Milanese.* 1939. Apr. Vol. 18. No. 4. pp. 218–224. With 2 figs. on 1 plate. French summary (4 lines).

For trematodes, fix in 70 per cent. alcohol; put in 10 per cent. caustic potash solution for 10 to 60 minutes or more according to

Results of Stool Examinations in French Colonies during 1937 [see p. 67, VOGEL & RIOU].

	Number of stools examined	Flagellates	Ascaris	Hookworms	Trichuris	Enterobius	Strongyloides	Taenia
Dakar	3,672	247	386	255	63	19	91	107
Senegal	1,553	2	39	99	8	—	16	7
Sudan	468	14	1	20	5	—	1	1
Niger	263	0	31	42	4	—	—	1
Ivory Coast	911	36	90	276	63	6	13	16
Dahomey	2,401	97	307	345	128	38	218	19
Guinea	2,510	82	247	405	76	27	37	358
Togo	23,543	161	3,416	2,865	48	174	116	33
Cameroons	52,018	1,712	36,721	25,033	13,107	1,825	239	724
French Equatorial Africa	35,653	—	8,109	8,374	4,900	456	1,017	3
Madagascar	44,328	77	3,083	965	1,301	272	202	102
Indo-China	17,335	2,013	9,837	4,664	5,660	0	318	167
New Caledonia ...	1,420	134	28	254	215	2	52	3
New Hebrides ...	170	0	41	41	41	3	5	0
Guadeloupe	737	0	247	295	354	0	74	2
Martinique	3,321	118	85	300	747	13	3	0
Guiana	2,584	46	246	1,029	185	7	0	0

size ; wash for half to one hour ; stain to a diffuse orange in VAN GIESON's picrofuchsin (if the earlier washing had been insufficient fine crystals form on the surface) ; decolorize in 70 per cent. alcohol till the yellow background disappears and the alimentary canal and genitalia stand out in red ; dehydrate in 90 per cent. alcohol, pass into xylol, and mount in balsam.

For cestodes, fix in Bouin for 12 hours ; wash in running water for an hour or two ; stain for 2 to 4 hours in a saturated solution of light green [verde-luce] in 95 per cent. alcohol ; treat in glacial acetic acid for 2 to 4 hours ; wash in running water for some hours, but do not let decoloration of the edges begin ; put in 10 per cent. caustic soda for some seconds until all is decolorized except the uterus ; wash rapidly in abundant running water ; counter-stain with borax carmine for some seconds ; wash rapidly in water ; dehydrate, compress between 2 slides, in 70, 95 and 99 per cent. alcohol ; pass through xylol into balsam. *C. L.*

VOGEL (E.) & RIOU (M.). Les maladies épidémiques, endémiques et sociales dans les colonies françaises pendant l'année 1937. Parasitisme intestinal. [**Epidemic, Endemic and Social Illnesses in French Colonies during 1937.**]—*Ann. de Méd. et de Pharm. Colon.* 1939. Apr. Vol. 37. Supplement. pp. 413–425.

The figures above (p. 66) for the different countries mentioned are comparable if, perhaps, the methods of examination were in all cases the same ; though that is questionable, and is at least unstated.

In addition there were reported : from Senegal 1 *D. caninum* and 2 *H. nana*, from French Equatorial Africa 227 *S. mansoni* and 242 Diphyllobothrium, and from Indo-China 296 *C. sinensis*. *C. L.*

HOFFMAN (W. A.) & JANER (J. L.). **A Parasite Survey of Isabela.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1939. June. Vol. 14. No. 4. pp. 439–444. With 1 chart. [Spanish version pp. 445–449.]

"Since schistosomiasis incidence was the primary consideration, diagnosis in great part had to be made by the concentration method. Each sample was examined four times, twice with smears of salt solution and Donaldson's iodine, twice with concentration (upper surface and sediment)."

By these often indefinite methods, hookworm infection was detected in 50·2 per cent. of males between 16 and 20, this being the maximum. Ascaris had its maximum of just under 60 per cent. between 1 and 5 years old. "Trichuris is probably the most ubiquitous parasite in Puerto Rico, and it is not surprising that higher rates obtain for this species" ; unfortunately they are not mentioned. "Scarcely one per cent. of the individuals studied harboured ova of *Schistosoma mansoni*." *Fasciola hepatica* occurred once in a young woman, 7,052 samples having been examined. Eggs of *Heterodera radicicola* were found in 76 samples, of Trichostrongylus in 1 ; of apparently a spirurid, perhaps a physaloptera, in 8. *Entamoeba coli* was frequent, *Endolimax nana* came second among the protozoa. "In comparison with surveys from many other regions, the figures given for *E. histolytica* seem quite low." The paper does not give more definite statements than those indicated above. *C. L.*

NITZULESCO (V.) & NITZULESCO (G.). Contributions à l'étude de l'helminthiase intestinale dans la région de Jassy [**Intestinal Helminths about Jassy.**]—*Bull. Acad. Méd. Roumanie.* 1939. 4th Year. Vol. 7. No. 2. pp. 100–103.

In 1,080 faeces from different persons examined microscopically by an unstated method, probably a smear, the main infections found were Trichuris 34·53 and Ascaris 12·77 per cent. The eggs of *Dicrocoelium dendriticum* were present in 3·74 per cent. but they were eggs swallowed in food, for when a second examination could be made after control of the diet, the eggs were never found, nor in those examined was there any evidence of hepatic disease.

It is added that in the dissecting room cysticercus has been found 4 times in the last 3 years, but never more than 2 or 3 to a body.

C. L.

SMETANA (Hans). **Nephrosis due to Carbon Tetrachloride.**—*Arch. Intern. Med.* 1939. Apr. Vol. 63. No. 4. pp. 760–777. With 5 figs. [51 refs.]

"In addition to hepatic damage, carbon tetrachloride poisoning sometimes causes alarming renal symptoms, such as oliguria or anuria, nitrogen retention and subsequent hypertension; the urine contains albumin, white blood cells, red blood cells, casts and bile.

"The anatomic basis for the clinical renal symptoms is nephrosis characterized by distention of the spaces of Bowman with albuminous precipitate, with swelling of the lining cells, swelling and vacuolation of the cells of the proximal convoluted tubules, degeneration and necrosis of the cells of the distal convoluted tubules and those of the loops of Henle, with desquamation, and by the presence of granular, hyaline and cellular casts in the tubules, with plugging of their lumens. Concretions are present whose nature and significance are obscure."

These conclusions are based partly on the literature and partly on 3 cases seen at the Presbyterian Hospital, New York, within the last year. One took an unknown quantity of the drug by mouth and died and the two others had used it for cleaning and one of them died. In the two that died, central necrosis of the liver lobules was marked. There was a tendency to bleeding in all. The histories, and clinical and pathological changes, are given for all. *C. L.*

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. 1939. July 29. Vol. 113. No. 5. pp. 410–415.—**The Use of Anthelmintics.**

A discussion on anthelmintics in New York was initiated by Janet TRAVELL along stereotyped lines. SMILLIE, with his great experience, made a valuable contribution from which these are extracts: "We have been looking for the ideal vermifuge for a long time, but it has never been discovered. . . . . Once you have seen a person die of oil of chenopodium poisoning you hesitate ever to give it again. It is a terrible death. . . . . Carbon tetrachloride may also be quite toxic. . . . . I have had two deaths, however, from the drug and here again it is a devastating experience." He accordingly advised the use of hexylresorcinol and touched on other matters familiar to readers of this *Bulletin.* *C. L.*

HARE (K. P.) & DUTTA (S. C.). **The Comparative Value of Oil of Chenopodium and Tetrachlorethylene as Anthelmintics for Use in Mass Treatment.**—*Indian Med. Gaz.* 1939. Apr. Vol. 74. No. 4. pp. 198–201.

As tested by D.C.F. tetrachlorethylene in a dose of 4 cc. cured a ten times higher percentage than did oil of chenopodium of guaranteed B.P. strength given in a dose of 30 minims; the former is the better drug on all counts considered by the writers.

The choice of an anthelmintic for mass treatment will fall on one which is non-toxic, reasonably palatable, easily dispensed, effective in one dose and inexpensive. An assessment of value, made by comparing the percentage of worms expelled by the drug under test with the estimated worm load, is held unsatisfactory. Unworming should be the test, and D.C.F. its basis used at a sufficient interval after the drug. The investigation now reported compared the effect of oil of chenopodium in single doses of 20 or 30 minims with tetrachlorethylene in single doses of 4 cc., given in the morning to fasting in-patients, it being certain that all the dose was swallowed. If it came up again it was repeated.

Oil of chenopodium				Tetrachlorethylene	
20 minims		30 minims		4 cc.	
Total cases	Percentage cured	Total cases	Percentage cured	Total cases	Percentage cured
17	0	84	4·8	87	48·3

In the tea garden coolies' view chenopodium is unpleasant to take while tetrachlorethylene is sweet to taste, pleasant to smell, does not burn the mouth, and produces an enjoyable if slight drunkenness. A weak woman of 18 suffered after tetrachlorethylene from severe vomiting, giddiness and drowsiness but was well by evening. This drug is about half the cost of oil of chenopodium. *C. L.*

SWALES (W. E.). **Tests of Phenothiazine, a Highly Efficient Anthelmintic. On a Means of Administration and the Indicated Uses for the Control of Parasitic Diseases of Sheep.**—*Canadian Jl. Comp. Med.* Gardenvale, Quebec. 1939. July. Vol. 3. No. 7. pp. 188–194.

Phenothiazine has, it is reported, been described as "comparatively non-toxic for pigs, sheep, rats, rabbits and humans." Ten experiments in which it was given to sheep are described, worms passed in the faeces and collected at autopsy being compared, with satisfactory results and no toxic symptoms. Its efficacy was increased by mixing in the bolus bicarbonate of soda and tartaric acid whose effervescence particulated it and so aided solution of a little soluble drug. It was given in doses from 1 gram to 0·3 gram for each pound for body weight. *C. L.*

JORES (A.) & WOLTER (H.). Ueber die Verwendbarkeit von Pyrethrum als Anthelminticum. [**Pyrethrum as an Anthelmintic.**]—*Klin. Woch.* 1939. June 24. Vol. 18. No. 25. pp. 885–889. With 2 figs.

MISCELLANEOUS.

LAMBERT (S. M.). **East Indian and Fijian in Fiji : their Changing Numerical Relation.**—*Bernice P. Bishop Museum Spec. Publication 32.* Honolulu, Hawaii. 1938. 14 pp. With 9 graphs.

The author discusses the principal causes of the depopulation of native countries in contact with white civilization and while giving due emphasis to the effect of decay of native custom and maladjustment to changed environment, points out that the introduction of diseases to which the natives have no immunity is, from the numerical point of view, the greatest cause of the decrease in population in Fiji. The ill effects of the commerical exploitation of the natives have largely been removed by British administration.

Of the imported diseases, epidemics of dysentery, influenza, pneumonia, measles, smallpox and tuberculosis are the most destructive, the latter accounting for 25 to 34 per cent. of the annual deaths.

The native population declined from 200,000 in 1870 to just over 87,000 in 1905, rose to 91,000 in 1917 and after reaching the low point of 82,000–83,000 after the influenza epidemic of 1918, rose to 98,291 in 1936. A graph shows that the crude birth rate has remained almost level since 1891, but the crude death rate has fallen fairly steadily and the gradual fall can almost be measured in terms of expansion of medical effort.

Comparisons may be made between the native Fijians and the East Indians living in Fiji. The birth rate per 1,000 females is higher in the Indians, but steadier, and showing a tendency to rise, in the Fijians. The birth rate in females of child-bearing age is more than 25 per cent. higher in the Indians than in the Fijians. The age group in which there is the greatest death rate is 0–4 years.

The author contrasts the Indians, survivals of thousands of generations exposed to every disease, now living in an ideal climate under vastly better economic conditions and practically free from the handicaps of caste, with the natives, decimated by imported disease and disconcerted by white civilization, but still showing the will to survive. As yet the Fijians preponderate numerically, but the author poses the question as to the probable outcome of the increase in the Indian population.

Every opportunity for making the Fijians health-conscious should be exploited through the cooperation of the Departments of Education and Medicine and should rest upon the approach of native medical personnel to the native general population. [That this procedure is now actively employed is evident from the reports of HOODLESS and MCGUSTY, this *Bulletin*, 1939, Vol. 36, p. 943.] *C. W.*

AIGUIER (C.). Djanet (Pays Ajjer). Etude géographique et médicale. [**Djanet (Ajjer Country). A Study of its Geography and Diseases.**] —*Arch. Inst. Pasteur d'Algérie.* 1938. Dec. Vol. 16. No. 4. pp. 533–587. With 1 map, 2 diagrams & 6 plates. [Refs. in footnotes.]

A detailed study of this remote oasis in the south-east corner of the Southern Territories of Algeria at 24°N. and an elevation of 3,900 feet.

In this oasis, where the author spent two years, the temperature ranges from 16° to 35°C. in the hot season and from 5° to 18° in the cold. Rain is a rare event, the fall in 1935 was 5 mm. but the subsoil is rich in water. The population numbers 1,300. The people, their habits and living conditions, houses, diet, are fully described. They wash neither their bodies nor their clothes and the body louse lives on them " in perfect tranquillity."

Passing to the diseases met with, *malaria* first appeared in epidemic form in 1928 [the French occupation dates back to 1911] following abundant rain and again in 1933 after another rainy period. In intermediate, dry years there were no fresh infections. The Anopheles, determined at the Algiers Pasteur Institute, are *A. hispaniola*, *A. broussesi*, and *A. d'thali*. They breed in disused wells. The parasite is *P. falciparum*.

The focus of *schistosomiasis* at Djanet, the only one known in Algeria, was first recognized in 1925 [see this *Bulletin*, 1926, Vol. 23, p. 474]. The natives have a name for it and know that it is contracted in bathing. The source is probably Tunis or the French Sudan and Niger, with all of which caravan communication is frequent. Whereas no case has occurred since 1933 among the troops, whose bathing is interdicted, it is common among the undisciplined civilians. Of 107 boys between 4 and 16 years 46 per cent. were infected and the proportion is probably as large among the girls, for all children bathe together. No acute case was seen and the only constant sign is haematuria with pyuria at the end of micturition. In adults a form of rheumatism (joint pains) or pseudo-sciatica was common. The existence of *pulmonary tuberculosis* in the Sahara has been denied, but the author says that since the arrival of the French it has progressed rapidly. In this oasis tuberculous infection is still small. Nil in children and adolescents it increases in the adult after the twentieth year, especially in males ; the positives to tuberculin have usually been servants to Europeans or Arabs.

Leishmaniasis, filariasis, trypanosomiasis and amoebic dysentery are at present unknown. No worms were seen in the stools but the children eat earth, especially a white stone which dissolves in water and is used to whitewash houses. Enterica, undulant fever, diphtheria and typhus are also unknown [and presumably relapsing fever which is not mentioned]. Smallpox is kept down by vaccination ; varicella is not uncommon.

Whooping-cough appeared in 1935. Of 226 cases 87 were in children under two years, 83 in those from 2 to 6 and 56 in those between 6 and 15. The death-rate in the infants was 19·5 per cent., in the intermediates 9·7, and in the older ones 7 per cent. ; 29 deaths in all. Lung complications were frequent. Many mothers had slight attacks.

Influenza first appeared in 1933, almost the entire population suffered and 90 died. A second epidemic in 1935 was mild. A disease

called "loumet" is described. It has been regarded as measles and as varicella. The author believes it to be rubeola but retains the native designation. Seven-tenths of consultations in the oasis are for eye diseases, especially trachoma. Other affections do not call for mention. *A. G. Bagshawe.*

RAYMOND (W. D.). **Tanganyika Arrow Poisons: A Medico-Legal Problem.**—*East African Med. Jl.* 1939. Mar. Vol. 15. No. 12. pp. 419–431. With 13 text figs. & 7 figs. on 3 plates. [24 refs.]

This is an interesting account of arrow poisons in Tanganyika Territory. The chief source of these is one or other species of Acocanthera, the active principle being a glucoside, ouabain; it is prepared mainly in the Liwale district. Fragments of the wood are boiled with water and the product concentrated to a sticky mass which is smeared on the arrow head. Its toxic effect depends on its entering the circulation, when it may kill in a few minutes, half an hour or so; when taken by mouth it has little or no toxic action. The preparation contains some 10 per cent. of the glucoside. The local antidote is a species of Fadogia, known locally as *kikulo*. Strophanthus, Adenium and Scilla are also employed for preparing arrow poisons.

The author's study is based on examination of some 40 poisoned arrows. The twisted iron behind the barbs may carry as much as 7 gm. of the poison. The m.l.d. for a cat is stated to be 0·12 mgm. per kilo, which for a 10-stone man would be 7·6 mgm. [not "approximately two milligrams," as stated in the text], so the quantity on an arrow, if all were injected, would be enough to kill 921 men [not "about 250"]. The toxicity, according to native belief, may be unimpaired even after several years' keeping. [In the list of references no mention is made of the article in BYAM and ARCHIBALD's *Practice of Medicine in the Tropics*, where considerable information, including much of that given above, on arrow poisons is to be found. See also this *Bulletin*, 1936, Vol. 33, p. 634.] *H. H. S.*

RAYMOND (W. D.). **Native Poisons and Native Medicines of Tanganyika.**—*Jl. Trop. Med. & Hyg.* 1939. Oct. 2. Vol. 42. No. 19. pp. 295–303. With 2 figs. [50 refs.]

The author continues his interesting notes on the native East African poisons though most of what he tells is gathered from well-known sources, and one would like to hear more of his personal experiences. In the present paper he remarks on the mixtures, more or less objectionable and noxious, given as medicines by the local African doctors, which depend for their effects to a great extent on the psychological conditions surrounding or connected with the patient. Some of those named having a local reputation in fever, helminthic infestation, venereal disease, are found wanting or inert when tried scientifically.

Mr. Raymond sketches briefly some of the commoner poisons of Tanganyika, dividing them into (1) Deliriants, (2) Ordeal drugs, (3) Fish poisons, (4) Homicidal poisons, (5) Arrow poisons. [This is not a good classification, for the groups overlap, and the third includes drugs used for stupefying fish to render them more easily caught, and also actual poisonous fish; also arrow poisons and ordeal drugs and deliriants can all be used for homicidal purposes.] Among deliriants, alcohol from fermented grain and fruits of various kinds takes an

important place, *e.g.*, *Pombe*, native beer made from millet, contains about 4 per cent. by weight of alcohol, *tembo*, or palm wine, 6·5 to 7·4 per cent. *Datura* (Stramonium) is classed as a deliriant and at one stage has this effect, but it is also an hypnotic, used for purposes of robbery [as the seeds can be mixed with curry unsuspected and the patient on waking remembers nothing of what has passed in the interval between the meal and the awakening (see BYAM and ARCHIBALD's *Practice of Medicine in the Tropics*, Vol. 1, p. 777)]. *Cannabis indica* (Indian hemp) is mentioned and *Argemone mexicana*. [The author, it is hoped, will investigate this last more fully, for it is incriminated as being the cause of epidemic dropsy when added as an adulterant to mustard oil (see this *Bulletin*, 1939, Vol. 36, pp. 909, 910).] *Erythrophloeum guineense* is described, but the active principle is not known with certainty; it appears to be an alkaloid and causes vomiting, diarrhoea and death by respiratory arrest.

Euphorbia species are used for rendering fish stuporous; the stems are beaten with stones and the resultant green mash is placed in open wicker baskets; these are immersed and then rotated in the stream for some ten minutes, and the men then come out and wait on the banks for about the same period when fish come to the surface dazed and the larger are caught. Human beings may be poisoned by drinking the water from pools which have been so treated.

Phytolacca dodecandra contains a bitter glucoside, saponins and an alkaloid in leaves and roots and gives rise to nausea, vomiting, thirst, diarrhoea with passage of blood, cyanosis, dilation of pupils, small, irregular pulse and stupor. *Courbonia camporum* is an irritant which may be fatal with intestinal haemorrhages; the active principle is not yet known. *Cucumis* (wild melon) contains *cucumin* (C_{27} H_{40} O_9), an amorphous white powder, sparingly soluble in water, more readily in alcohol; it may produce severe gastro-intestinal irritation, or, in large doses (in animals) sudden death without any characteristic symptoms. In Tanganyika patients suffer from violent haemorrhagic diarrhoea. The symptoms of *Dioscorea* poisoning are known (see this *Bulletin*, 1938, Vol. 35, p. 76) as are those due to Tetrodon [not Tetroden] and cantharides. [Among the references, the article on Vegetal and Fish Poisoning in BYAM and ARCHIBALD's *Practice of Medicine in the Tropics* is not mentioned, though many of the poisons referred to in the present paper are there spoken of.] *H. H. S.*

REVIEWS AND NOTICES.

BRADFIELD (E. W. C.) [Major-General, C.I.E., O.B.E., K.H.S., I.M.S., Director-General, Indian Medical Service]. **An Indian Medical Review.**—pp. iii + 658. 1938. New Delhi: Govt. of India Press. [Rs. 2–8 or 4*s*.]

This interesting account of medical progress in India consists of 279 pages of description, including numerous useful tables, and 360 pages of statistics. It summarizes an immense amount of information in Government of India and Provincial Government medical reports in a convenient form, with historical information on the evolution of medical advances in various directions.

The medical profession in India is now placed at between 35,000 and 40,000, only 667 of whom are I.M.S. officers and 740 are medical missionaries. Chapter II deals with Hospitals and Dispensaries, and the appendices consist mainly of statistics of them, province by province. These tables show the number of beds and patients, the cost and the medical and nursing staff, including midwives who are so important under the Indian purdah system. Information is given on the modern system of Indian honorary medical officers, who have the highest qualifications. The vexed question of supplying rural medical relief, owing to the impossibility of qualified medical men making a living in villages, is being dealt with by subsidies. The influence of the Indian Provincial Governments is seen in the efforts to pass legislation to foster the cheap indigenous Ayurvedic and Unani systems of medicine, although in a later section it is recorded that a very early support of such schools was abandoned. The same influence is seen in the admissions to medical schools being in some cases on a communal basis, irrespective of the education qualifications of the candidates apart from a fixed minimum. An advance has been made in providing post-graduate teaching for Assistant-Surgeons in hospital employ. The mental hospitals in all India only number seventeen. Tuberculosis presents a very serious problem, but for this disease the beds only number 2,768. Hospitals and asylums for leprosy number 78, and the 54 under medical missionary administration alone supply 10,345 beds. In addition there are 1,124 leprosy clinics in India, mostly in Madras, Assam and Bengal.

Medical education is dealt with fully in the longest section of 108 pages, which includes a historical account of its development. The first medical colleges were opened in Calcutta and Madras in 1835, yet there were only four in India up to 1910, but now there are ten and one for women only with five-year courses, particulars of which are given. The British General Medical Council first recognized Indian University teaching in 1892, but the supervision is now carried out by an Indian Medical Council. Medical schools teaching for a lower grade diploma were also begun over a century ago, and there are now no less than eighteen Government and nine non-Government schools. A report of Major-General Sprawson is quoted to show that these schools vary extremely in their standards of teaching, which is for four years, except in three instances with five. Many are not well staffed and a table shows that most of them are deficient in all of the seven standard rules he laid down for them. It has recently been decided to bring the best of them up to the five-year university standard and to close the rest so as to have only one qualifying standard in India. In 1937–38 they had a total of 6,492 students. Military medical students are trained for British military hospitals under a different standard. This education section supplies much valuable information. Shorter chapters show the steadily improving conditions regarding nursing and maternity work in India.

A fifty-page chapter on medical research and the institutions in which it is carried on is of especial interest. After mention of some of the early research workers, the development of research laboratories is traced beginning with the Bombay Plague Research Laboratory in 1899, the Kasauli Pasteur Institute in 1900, and the Central Research Laboratory at the same hill station in 1906, a year after the Bacteriological Department (now the Medical Research Department) of the Government of India, was started with 13 officers, since increased to 30.

In 1920 the School of Tropical Medicine and Hygiene was opened in Calcutta, and expanded in 1932 by the opening of the Institute of Hygiene and Public Health built at the cost of the Rockefeller Foundation. One-fourth of both the capital cost and the research income of the School of Tropical Medicine was provided by an endowment fund raised by public subscription. In addition to describing these institutions this section summarizes the researches in recent decades under thirteen heads, including malaria, cholera, plague, kala azar and leprosy.

The remaining sections deal with medico-legal work, pharmacy and drug control, including the important quinine policy, and the work of various societies such as the Red Cross, St. John Ambulance, the Leprosy Association, the anti-tuberculosis fund and nursing associations. In addition to a full table of contents the index (so often lacking in Government publications) will be of use to those acquainted with India, but anyone seeking information on the Hygiene and Public Health Institute or the Leprosy Association, for example, will only find it under " All-India " and " British India " respectively.

Enough has been said to show that this compilation is of great value as a work of reference on medical matters in India, and Major-General Bradfield has performed a very useful piece of work in publishing it. *L. Rogers.*

ROCKEFELLER FOUNDATION. INTERNATIONAL HEALTH DIVISION. **Annual Report 1938.**—233 pp. With 24 figs. on 12 plates. New York : 49 West 49th Street.

In the reviewer's opinion no single book of the size of this report contains so much that is of interest to the investigator and practitioner in the tropics. As a whole it is difficult to review and it cannot be abstracted because, like the homoeopathist's " mother tincture," it is already so concentrated that abstraction would be synonymous with extraction. All interested, and this includes most tropical workers, should try to obtain a copy and keep it within close reach for reference until the researches therein described have been embodied in the current text-books.

After some remarks on virus studies in general in which stress is laid on the value of the analytical ultra-centrifuge with its optical system for photographing sedimentation, and on the refinements in electrophoresis methods and apparatus, the report considers, discusses and summarizes the work of the year under three main heads : (1) Control of specific diseases, notably yellow fever, influenza, malaria and tuberculosis ; (2) Aid given to central or local departments of health ; (3) Similar aid to public health education by grants to schools and training centres and fellowships for post-graduates.

Much of what is related under Yellow Fever has been abstracted in this *Bulletin* because the report gathers together the work of its staff or subsidized persons engaged on investigations into this disease, most of whom have published the results of their studies. Here, however, we have the separate pieces brought together into their proper places to constitute the finished picture. A story of the highest interest is told of the early knowledge and development of rural and jungle yellow fever which first led to doubt of the all-efficiency of ridding a country of yellow fever by " sanitation of the seedbeds of infection " ; how, for the former, the programme of

mosquito control had to be extended from the larger to the smaller towns and even to rural areas, and how, for the latter, mosquito control did not succeed, and that new problems altogether had to be tackled. The confirmation of the value of the use of the viscerotome is exemplified. [This instrument was *not* introduced in order to aid health officers in coming to a diagnosis, for suspected cases ending fatally should be subjected to autopsy. The purpose of its introduction was to discover fatal cases in otherwise " silent " areas and is used as a routine on all those over one year dying within ten days of the onset of a febrile illness.] Next, the connected story of vaccination by means of virus 17D against yellow fever is related ; how it began with a single vaccinating unit in a region where cases had occurred a few weeks before, and how, after some 3,000 persons had been vaccinated, other units took the field and mass vaccination of rural populations in threatened areas was undertaken. Studies have been made in the Rockefeller Foundation laboratories in New York to determine the keeping qualities of the virus and it was found it keeps well if desiccated in the frozen state, provided the residual moisture is less than 2·5 per cent. ; if 4 per cent. it would retain activity for 10 days at 37°C., if over 6 per cent. it lost activity within 24 hours, but—and this is important—the preparation, whether containing 2·5 or 6 per cent., showed no difference in appearance. Many mosquitoes were examined as to vector capacity and two forest species, *Aëdes leucocelaenus* and *Haemagogus capricorni* definitely incriminated, and species of Sabethinae suspected. A horse was the usual bait with an ingenious tent-like trap for catching the mosquitoes before they reach the animal. Vaccination cannot, with present knowledge, be expected to eradicate jungle yellow fever because the disease appears to exist independently of the human population and to spread by other than human carriers.

In the course of investigating influenza virus two hitherto unknown viruses have been studied—that of acute meningo-pneumonitis obtained from ferrets inoculated from human beings suffering from what appeared to be epidemic influenza, and a pneumonia virus of Swiss mice. Neither has been proved to be aetiologically related to human disease, but both are important in any laboratory investigation of acute respiratory infections. Apart from the work in the New York laboratories the Foundation has given assistance to other laboratories carrying out research on influenza, the California and the Minnesota State Departments of Health, the New York Westchester County Health Department, the New York University College of Medicine, the University of Pennsylvania, and a unit in the State Institute of Hygiene at Budapest.

Work on tuberculosis continues and, most important, on yaws and syphilis. A finding which may lead to great results is that in a series of animals recently inoculated with yaws and syphilis spirochaetes respectively the lesions differed as markedly as when they were isolated 5 and 6 years ago. The spirochaetes of yaws and syphilis and certain filterable viruses remain virulent up to a year when frozen in containers surrounded by solid carbon dioxide and 95 per cent. alcohol—a useful method of preservation. The virulence of *L. icterohaemorrhagiae, Spirillum minus* and the virus of *Lymphogranuloma inguinale* keep well at —78°C.

In scarlet fever a study was made to determine the value of the antistreptolysin reaction in identifying ill-defined atypical and latent

cases of the disease. Other studies which need not be detailed included rabies, its epidemiology and immunity, Rocky Mountain spotted fever and sylvatic plague and certain helminthic infestations.

Malaria occupies a large place in the scheme, both control and research. Reference is made to the sensitive and specific complement fixation test in monkey malaria, with antigen of washed *P. knowlesi*, also the agglutination phenomenon with the same was demonstrated, and the effect of sulphanilamide in *P. knowlesi* infected rhesus, proof of cure being splenectomy without relapse. The drug is efficacious in the same infections in man, but not in *vivax* infections.

An important section of the report deals with the introduction of *Anopheles gambiae* from Africa into Brazil, where it is thought it will prove far more dangerous than any of the native vectors. Unless its spread can be checked—it has proved to be "the greatest traveller of the anopheline tribe"—it may eventually extend as far as the Southern United States and the Argentine and would then create a public health problem more important than all others in tropical America. Studies are also being made of nearly related forms geographically far apart and to find out why a malaria vector in one place is harmless in another; thus *A. atroparvus* is the carrier of nearly all the malaria in England, the Netherlands, Germany and Portugal, but is relatively harmless in France, Hungary and Italy.

Aids to State and Local Health Services are many and include grants for Public Health Administration in North Carolina, in South Dakota, and Mexico; for sanitary engineering, industrial hygiene and various local Health Departments. Grants for Public Health Education are many and widely distributed, *e.g.*, Johns Hopkins University, Stockholm, Bulgaria, Athens, Budapest, Toronto, Peiping, Zagreb (Yugoslavia) and others.

The value of the work of the Foundation may be gauged to some extent, when we bear in mind that the above is but a brief sketch of part of its beneficence. *H. H. S.*

SMITH (E. C.) [B.A., M.D., D.P.H., Sc.D. Dublin; M.R.C.P. London; M.R.C.P.I.; D.T.M. & H. England, Senior Pathologist, Medical Laboratory Service, Nigeria]. **An Introduction to Pathology and Bacteriology for Medical Students in the Tropics.**—pp. xi+279. With 77 figs. & 18 coloured plates. 1939. London: John Bale, Medical Publications, Ltd., 85 Great Titchfield Street. [15*s*.]

This book, as its title indicates, is not a complete guide to the subjects with which it deals, but aims at giving the student in the tropics a groundwork in bacteriology and pathology. Only occasional and brief mention is made of biochemical questions. Haematology and protozoology receive fuller consideration. Technical details of elaborate laboratory tests are not included but adequate descriptions of some of the simpler procedures, such as reticulocyte counts, are given.

Throughout the book Dr. Smith has preferred to state that "the cause is unknown," rather than encumber his pages with discussions of theories which, so often, have merely an historical interest.

The plan of the book is somewhat original. After five introductory chapters on general principles, groups of disease processes are considered *seriatim* in a broad way, the pathogenic agent and the morbid changes it provokes being described with the laboratory methods

available for diagnosis and a brief summary of clinical signs. In this way is presented a more complete picture of the pathology of the disease than any other single text-book affords. The text is illustrated by many excellent original photographs and diagrams and by eighteen very beautiful whole-page coloured plates. The magnification of the former, but not of the latter is given.

The subjects selected for detailed study are naturally those of special importance in the tropics. But many others are referred to shortly in the appropriate sections. Thus, in the chapter "Diseases due to the genera Pasteurella and Brucella," plague is considered at length and brief notes on tularaemia, undulant fever, melioidosis and glanders follow.

Certain subjects of general application, such as immunity, hypersensitiveness, vaccines and Koch's postulates are discussed in various later sections of the book, instead of in the introductory chapters where they would more fittingly appear. The continuity of the text is disturbed by this arrangement. The reticulo-endothelial system perhaps merits a fuller account than that assigned to it. In the section on nephrosis, one feels that, for once, Dr. Smith's lucid style has forsaken him.

Two very useful appendices are given. One, in tabular form, on the differential diagnosis of the various inflammatory enlargements of lymph glands; the other on post-mortem technique. The index is full and accurate.

The book is printed in clear type on high-grade paper; the excellence of the illustrations is a pleasing feature.

There must be many pathologists in the tropics who have experienced the author's difficulty in recommending text-books to their students. They will be grateful to Dr. Smith for placing at their disposal, in a work of moderate size and price, a most useful introduction to their subject.

J. B. Davey.

TJIOOK KIEM BOK. **Over tropische spruw en experimenteele B_2-deficienties bij honden en apen.** [Tropical Sprue and Experimental B_2 Deficiency in Dogs and Monkeys.] [Thesis for Doctorate of Medicine, University of Amsterdam.]—164 pp. With 26 figs. & 4 plates. [102 refs.] English summary. 1939. Amsterdam: Drukkerij M. Lindenbaum & Co., N.V.

An excellent systematic and detailed account of sprue is given in this thesis with a useful chapter on sprue-like diseases. These cases are essentially clinical. On the experimental side are given the author's researches into the "black tongue" disease of dogs, which is curable by nicotinic acid and which is now regarded as identical with pellagra. His sprue cases number thirty-five and at the end of each of them he presents a summary of the outstanding conditions which led to the diagnosis of tropical sprue. A composite picture of the features generally prevailing would, on extraction, give the syndrome as:—(1) Anorexia and dyspepsia. (2) Fat diarrhoea, with much fat and fatty acids in the fermenting stool and without blood or mucus. (3) Emaciation. (4) Painful glossitis. (5) Hyperchromic macrocytic anaemia, and frequently histamine-refractive hypo- or achlorhydria. (6) Sluggish ankle reflex. (7) Hypocalcaemia with tetany and osteoporosis. (8) Flat blood-sugar curve. (9) Therapeutic betterment with sprue diet, liver treatment and, sometimes,

iron or calcium medication. The differential diagnosis concerns itself with pellagra, pernicious anaemia, non-tropical sprue, pancreatic diarrhoea, intestinal tuberculosis, gastro-jejuno-colic fistula, Addison's disease, regional ileitis. In pellagra the presence of symmetrical dermatitis, true psychoses, a deficient dietary, colic, and blood in the stools are important features. Routine microscopic diagnosis of the degree and type of fatty diarrhoea is made by mixing on a slide a small quantity of faeces with some drops of the following solution : glacial acetic acid 18 ; 96 per cent. alcohol 2 ; sudan III 1. The acetic acid converts soaps to fatty acid. The sudan III stains neutral fat and also, when the slide is warmed, the melted fatty acids. On cooling the unstained fatty acid crystals separate out. In general, prognosis in tropical sprue is good. This is a curable disease and the patient can, after cure, be "self-supporting," dispense with liver treatment and even return to the tropics.

The author's animal experimental work was based on that of MILLER and RHOADS who obtained in dogs by means of B_2-deficient diet chronic relapsing "black tongue disease" with much similarity to sprue : mouth and tongue symptoms in the form of redness and atrophy, emaciation, diarrhoea and finally hyperchromic macrocytic anaemia. The animals used were 7 young dogs and 2 adult Macacus monkeys and the basal diet had the composition : white maize flour 400 ; ashless casein 60 ; calc. carbonate 30 ; sodium chloride 10 ; salad oil 30 ; cod liver oil 15. In the diets called I, II, III, IV and V various additions were made to the basal diet. Black tongue disease was caused in 5 out of the 7 dogs. The opportunity is taken to go in some detail into the symptomatology, pathology and therapy of this disease. It could be effectively cured by brewer's yeast or nicotinic acid. An interesting observation was that the hair of two of the dogs turned grey and was not restored to normal during the experiment. Of the two monkeys used one developed on the testing diet a hyperchromic macrocytic anaemia, the other only a temporary macrodiametria of the erythrocytes.

Embodied in the detailed conclusions are some points worthy of special note :—(1) Amoebic and bacillary dysenteries do not seem to play an aetiological rôle in sprue nor do either a deficient diet or alcoholism. (2) "Treatment with a low-fat, low-carbohydrate, high protein and high vitamin diet including liver is nearly always followed by clinical cure." (3) While experimental black tongue and human pellagra may be considered to be closely allied diseases there is little in the pathogenesis of black tongue disease which throws light on the aetiology of sprue. *W. F. Harvey.*

[British workers maintain that, though osteoporosis is common in non-tropical sprue and sprue-like diseases, it is not a feature of true (tropical) sprue and is, in fact, an important factor in differentiation.—ED.]

HERMS (W. B.). **Medical Entomology, with Special Reference to the Health and Well-being of Man and Animals.** Third Revised Edition.—pp. xix+582. With 196 figs. 1939. New York : The MacMillan Co. [£1 4*s.* 0*d.*]

The present work is the third edition of the author's Medical and Veterinary Entomology, which was last published in 1923, and is

much used in America. It is dedicated to the late Professor G. H. F. Nuttall, of whom an excellent photograph forms the frontispiece.

The general plan of the book is clear and logical. Introductory chapters deal with the historical development of parasitology, effects of parasitism on host and parasite, types of transmission, etc. The author then gives an anatomical account of Insecta and Arachnida, emphasizing mouth parts. A succession of chapters follows, each dealing with an order, or smaller group, of insects of medical importance. The book is concluded by discussions on the venoms, and the therapeutic uses of arthropods. The balance between the medical and veterinary sides of entomology is well held. An excellent feature of the book is the common-sense sections on such things as "Fleas in the Household."

One might perhaps say that text-books fall into two groups. Some are equally competent throughout, and tend to be dull; in others the author shows his own preferences so that parts of the work are particularly good, though it is not very even. The present book comes in the latter class. The author gives an extremely useful and interesting account of relapsing fever in the United States, complicated as it is by the presence of many species of Ornithodorus, and by their relationships with numerous sorts of wild rodents. One would turn to Herms for information on this perplexing subject. He also gives a full account of the entomology of Rocky Mountain spotted fever, in the U.S.A. (but nothing to indicate that it occurs elsewhere). His accounts of farm entomology and fly control are also most valuable. But he is much less successful in describing some tropical sides of the subject, among them the entomology of Central African relapsing fever, or the biology of Glossina.

It is always a matter of opinion as to how space should be distributed in a book. The author's personal interest has led him to give 5 pages to the possibility that Stomoxys transmits poliomyelitis, though that was ruled out 25 years ago, since when nothing significant has been published. One wonders also why such a family as the Polyctenidae should be included, for they are parasites of bats and nothing else, and in no way related to medicine of man or animals. It might perhaps have been better had space been saved for an account of modern work on the relation of fleas to climate, a subject on which a fairly complete picture is now available. Modern work on the control of the bed bug is another subject which would merit fuller treatment.

The wording is sometimes careless or misleading. For instance, the author says that "probably all species of vertebrate animals are subject to attack by ticks," a view that could hardly be supported even if terrestrial vertebrates are intended: and again "40 per cent. formaldehyde is poisonous like wood alcohol if taken internally."

P. A. Buxton.

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